THE JOURNEY TO PREDICTABILITY
Since the beginning of the e-commerce era, retailers have been thrust into a never-ending competition to provide shorter delivery windows. In many ways, securing customer loyalty meant winning the service level agreement (SLA) race — or at the very least, keeping pace with your competition. These competitive pressures provided the impetus for a digital transformation in the supply chain and material handling sector, where many retailers are in various states of transition from manual processing to an increasingly automated paradigm.

BUT THERE’S STILL MUCH WORK TO BE DONE HERE.

A recent study of supply chain and operations professionals revealed that 95 percent of survey respondents are not fully capitalizing on the benefits of digital technologies, including:

- Physical and mechanical innovations such as robotics, advanced automation and augmented reality
- Informational and analytical innovations such as artificial intelligence (AI), machine learning (ML) and the industrial internet of things (IIoT) on which they rely

At the heart of this challenge is our industry’s relationship with operational data, which compared to other sectors, has been relatively slow to utilize and reap its many benefits. Data utilization is foundational to making a successful transition into the future of e-commerce, not only from a digital transformation perspective, but also in our ability to meet the challenges that await us.

UNLEASHING YOUR DC’S POTENTIAL

Most distribution and fulfillment center operators don’t realize that they already have a wealth of data at their disposal. Regardless of their operational sophistication (or lack thereof), this data resides in machine control systems — in everything from conveyance and sortation to automation and robotic systems. Everyday, these machines communicate with each other and generate operational statuses, which with the proper tools, can be transformed into real-time insights and operational alerts.

Utilizing control system data is merely the first fundamental step. To continue enhancing operational performance with data-driven intelligence, operations need a holistically connected infrastructure — one that enables visibility into the performances of both labor and machines, as well as provides actionable insights and automated decision making via robust analytics and execution software.

Thankfully, the tools needed to capitalize on distribution center (DC) data are available today, and Honeywell Intelligrated is helping accelerate this much-needed transition. We’re utilizing our deep industry experience and expertise to develop ML algorithms and AI technologies that enable the abilities to optimize operations in real time and detect potential issues before they occur.

Indeed, data is the fuel along the journey to predictability and profitability, and its impacts can be felt in nearly every aspect of DC operations. In this edition of our On The Move publication, you’ll find more information on how to unleash your DC’s potential by leveraging data to:

- Achieve critical business outcomes in lifecycle management programs
- Empower decision-making support in warehouse execution systems (WES)
- Drive DC performance and predictive maintenance
- Maximize labor efficiencies and help with retention

You’ll also learn more about the latest robotic technologies, sortation innovations, automated storage and retrieval systems (AS/RS) capabilities and voice-directed efficiencies — all of which can be integrated into a data-rich ecosystem that drives the continuous performance improvements needed to succeed in today’s competitive climate.

At this point in the evolution of e-commerce fulfillment, our industry needs every tool at our disposal to meet customer SLAs while maintaining profitability. At Honeywell Intelligrated, we believe this endeavor is attainable — but it must start and end with data.

PIETER KRYNAUW
President, Honeywell Intelligrated

WHAT’S NEXT: Adopt AS/RS to Improve Picking Accuracy and Speed

Automated storage and retrieval systems (AS/RS) are helping DC operators keep pace with the ever-increasing order volume and velocity of e-commerce.

The Journey to Predictability

Lifecycle management program administrators can no longer afford to ignore their operational data and expect to achieve their critical business outcomes.

Automation Helps Manage Continued E-Commerce Growth

E-commerce survival requires the sortation capacity to support an expanding, diverse inventory; error-free fulfillment; and fast, free delivery options.

New Angles to Optimize DC Operations

Maneuver your DC workflows in any direction with Transnorm’s high-performance automated conveyor and sortation components.

Reduce Training Time and Raise Productivity With Honeywell Voice

Learn how the latest generation of Honeywell Voice technology is helping a leading pet product manufacturer meet increasing requirements for faster picking and inventory replenishment.

Connect to the Power of Predictive

Make the transition to predictive maintenance and automate the creation of service tasks within connected DC environments.

Grow Smarter

Leverage data-driven intelligence for dynamic, automated decision making based on order priorities, labor availability and automation system status.

The Future of Dock Unloading

Learn how advanced vision, intelligence and grasping technologies enable next-generation robotic unloaders to double the speed of human labor.

The Science of Labor Productivity

Advances in data science, artificial intelligence (AI) and machine learning (ML) are transforming labor management software (LMS) capabilities.

Automation Helps Manage Continued E-Commerce Growth
PREDICTIVE POWER OF TO THE CONNECT

performance indicators (KPIs) — many of which would appeal to distribution center (DC) operators: operation delivered a 1,000 percent return on investment (ROI), including the following key professionals revealed that the average savings from an IIoT-driven predictive maintenance a decade ago. A 2010 Department of Energy (DOE) study of operations, maintenance and energy This isn’t the case in the energy sector, where IIoT’s transformative operational impacts were proven difficult to measure.

The proliferation of warehouse software, management systems and technologies can present compatibility challenges when integrating existing assets into a connected infrastructure. And for most companies, the absence of a viable change management strategy prevents them from achieving fundamental progress and affecting the required organizational shift needed to embrace a data-driven enterprise.

But the risks of doing nothing and not making a digital transformation may be even greater. The increasing digitization of operations, business transactions and customer interactions dictate that retailers implement IIoT infrastructures to:

• Ensure customer service level agreements (SLAs) are met
• Address e-commerce pressures
• Ensure customer service level agreements (SLAs) are met
• Shorten order cycle times and delivery windows

In a world where reliable, consistent uptime is a true differentiator, skilled service technicians are vital to an operation’s success. But as a generation of service veterans nears retirement, there are few qualified technicians poised to replace them. This trend is creating a significant knowledge and service gap that presents a long-term threat to many operations. As a result, DC operators are in a race to improve training processes, recruit new candidates, and quickly get them up to speed.

All these challenges present opportunities for connected, IIoT infrastructures to succeed.

HOW TO MAKE AN EFFECTIVE DIGITAL TRANSFORMATION

Many early digital transformation efforts are falling short or missing the mark:

• Over the last 12 months, 81 percent of IT decision makers have seen a digital transformation project fail, suffer a major delay, or get scaled back.

The most common barriers to successful IIoT adoption can be traced to three primary causes:

• Lack of understanding of the technology landscape and its effects on your business
• Lack of adequate talent to effectively implement and utilize the technology
• Lack of a clear business case to justify the investment

STEPS TO SUCCEED

1. CREATE A STRONG BUSINESS CASE.

• IIoT adoption leaders were 75 percent more likely than IIoT laggards to cite the preparation of a strong business case or clearly articulated vision for value creation as key factors in their IIoT programs’ success.

2. START SMALL AND CLEARLY DEFINE THE SCOPE.

• Digital transformation is an iterative process
• Choose a key area of operations (about which many stakeholders care) and establish time-bound parameters.
• Create an actionable business plan with goals for achieving a specific financial outcome.

3. BUILD A COMPETENT, CAPABLE IIOT INNOVATION TEAM.

• Visionary: establishes the vision and provides clear direction
• Motivator: engages the team with a common goal and coaches others along the way
• Executor: brings the necessary resources and capabilities to drive change through your organization

CONNECT TO THE POWER OF PREDICTIVE

LEVERAGING OPERATIONAL DATA TO DRIVE DC PERFORMANCE AND MAINTENANCE IMPROVEMENTS

Whether you call it industry 4.0, the industrial internet of things (IIoT) or digital transformation, many material handling companies are recognizing the need to make a fundamental shift in the ways they run their distribution and fulfillment (D&F) operations. In fact, 70 percent of material handling executives consider industry 4.0 a top priority.

While the potential benefits of IIoT technologies are well-known in other industries, the D&F sector has experienced relatively slow adoption rates. A recent study revealed that only 2 percent of executives had identified supply chain performance as a focus of their digital strategies. This trend suggests that the importance of IIoT may be both misunderstood and/or its potential benefits difficult to measure.

This isn’t the case in the energy sector, where IIoT’s transformative operational impacts were proven a decade ago. A 2010 Department of Energy (DOE) study of operations, maintenance and energy professionals revealed that the average savings from an IIoT-driven predictive maintenance operation delivered a 1,000 percent return on investment (ROI), including the following key performance indicators (KPIs) — many of which would appeal to distribution center (DC) operators:

• 25–30 percent reduction in maintenance costs
• 70–75 percent elimination of equipment breakdowns
• 35–40 percent decrease in downtime
• 20–25 percent increase in production

Elsewhere, the building automation sector has been deploying IIoT best practices for more than a decade. Other industrial sectors, like the oil and gas industry, have also willingly embraced the power of operational data. Despite the differences between these sectors and D&F, they share similar business objectives and KPIs — and the same potentially transformative benefits.

D&F CHALLENGES AND OPPORTUNITY COSTS

Compared to these industries, D&F has its own unique complexities, barriers to adoption and opportunity costs. Because no two operations are alike, it can be difficult to approach implementation from a “standard” perspective. The ever-present risk of disrupting operations in a hyper-competitive, e-commerce fulfillment sector also may be a deterrent.

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ON THE MOVE 2020 CONNECT TO THE POWER OF PREDICTIVE
THE TRUE COST OF DOWNTIME

Up to 80 percent of businesses are unable to accurately estimate their downtime rates. Many underestimate downtime costs by 200–300 percent. The following factors are often ignored when calculating downtime:

• Lost production
• Recovery costs
• Wasted labor/productivity
• Missed customer SLAs
• Depleted inventories
• Mechanical equipment/system stress
• Disruption to innovation
• Loss of brand loyalty/customer trust

The true cost of downtime is typically associated with disruptions to services, operations, and innovation, which result in:

• Disruption to innovation
• Mechanical equipment/system stress
• Depleted inventories
• Missed customer SLAs
• Wasted labor/productivity
• Recovery costs
• Lost production
• Reoccurrence of issues
• Loss of brand loyalty/customer trust

EXPAND YOUR INSIGHTS

The addition of condition sensors on equipment motors and gearboxes provides even deeper insights into system performance, including the ability to predict equipment and system failures before they occur. Data extracted from vibration and temperature sensors — combined with smart analytics software, machine-learning algorithms and artificial intelligence (AI) — can detect and track deviations from performance baselines.

Today’s machine-learning algorithms are refined to such a degree that they only generate alarms when parameters exceed defined temperature and vibration thresholds. For example, consider these insights gleaned from a sensor on a sortation system gearbox. Trending data from analytics software indicates an incremental, steady increase in gearbox vibration. The alarm management system sends a notification that corrective action is needed before the next scheduled preventative maintenance (PM) interval. Upon inspection, technicians perform a series of maintenance tasks:

• Grease floating sprocket and idler shaft bearings
• Inspect and adjust all timing belt pulleys
• Ensure alignment and evenly torqued components

After servicing the gearbox, the analytics software indicates that vibration had returned to normal levels. If maintenance teams waited until the next PM interval, there’s a high probability that the vibration could have escalated to equipment failure — shutting down the conveyor and causing a domino effect of performance issues and missed SLAs.

It’s important to realize that these insights are available on any equipment utilizing motors, gearboxes and controller data, e.g., palletizers and robotics.

UTILIZE EXISTING CONTROL SYSTEM DATA

Many leading retailers are beginning to test the IIoT waters via pilot programs. For those that are new to utilizing their data, a good place to start is by tapping into the vast amounts of available data from their machine control systems.

It’s estimated that there are hundreds of thousands of data points that can be accessed from a control system, but this data is largely underutilized. Some operators pull data from programmable logic controllers (PLCs) periodically throughout a day or shift. But because PLCs are only capable of storing limited amounts of data, this information alone is transient and offers no trending information or insights. What’s more, only roughly 25 percent of this data has any real value.

To extract value from control system data, operators need software and analytics tools to make sense of it. By continually aggregating and interpreting this data, these tools filter out the noise to deliver historical and actionable insights that provide tremendous operational value. Analysis of conveyor run statuses can help DC operators evaluate trends and actionable insights that provide tremendous operational improvements.

INTEGRATE PREDICTIVE INTO MAINTENANCE PROCESSES

By connecting analytics insights to other fulfillment technologies, operators can automate the creation of service tasks and make the transition to a true predictive maintenance model. Doing so requires integrating one or more of these key enabling technologies with a connected DC infrastructure:

• Computerized maintenance management system (CMMS)
• Voice-directed maintenance and inspection technology
• Augmented reality smart glasses for live troubleshooting

For example, DC operators could potentially automate the entire find-and-fix process from issue detection to resolution:

1. Analytics software detects when a KPI is out of range.
2. Work order request is triggered to an on-site maintenance technician.
3. Technician receives an alert, then initiates a voice-guided inspection workflow.
4. Smart glasses allow the technician to share live audio/video in real time with OEM experts.
5. Technician completes voice-guided work, records the fix for future reference, and automatically generates a CMMS report/issue resolution status.

PREPARING FOR A MORE CONNECTED FUTURE

Based on current market trends, the abilities to predict equipment failure and achieve visibility into operations will become even more important in the next 3–5 years. Market growth paired with a declining technician workforce will dictate the need for more predictive automation. As a result, enterprise and DC operators will need the insights to implement smarter processes and achieve more reliable equipment operation.

Connected infrastructures help relieve these operational burdens while delivering the business intelligence to drive continuous bottom-line improvements. This approach is applicable in operations old and new, large to small, and everything in between.

Some forward-thinking companies are building connectivity into the specification of new DCs. From the outset, this will enable predictive capabilities while protecting their new equipment investments. Existing facilities have just as much to gain, and can retrofit connectivity within control systems, equipment sensors, and smart analytics and visualization software.

Regardless of your business or operational goals, Honeywell Intelligrated has the technologies to help you build a more connected present and a more predictable future. Our Connected Assets offering is helping our customers enhance their operations today while laying the groundwork for ongoing, data-driven performance improvements.
Many leading retailers are increasing their investments in new automation software and technologies that will help them adapt to this new era of distribution and fulfillment (D&F). At the top of this list is the modern warehouse execution system (WES). Unlike its warehouse automation software predecessors, a WES delivers data-driven decision intelligence to enable:

- Real-time visibility into order status, inventory, and fulfillment operations
- Dynamic, automated decision making based on order priorities, labor availability, and automation system status
- Accurate predictions and proactive decisions to avoid congestion and provide optimal balance of all warehouse activities impacting order fulfillment

These advanced WES capabilities represent a giant leap forward for operations that have relied on legacy warehouse automation software. Traditional warehouse management systems were designed for a different era of commerce, but today’s e-commerce retailers face a volatile mix of challenges, including:

- Large volumes of uncertain demand of single-line orders with seemingly infinite varieties
- A wide range of delivery agreements, from next-day to next-week
- Seasonal fulfillment spikes that can potentially account for a significant portion of annual profits
- The ongoing transition from labor- to automation-driven processes

To prepare for the future of e-commerce fulfillment, DC operators will need to adopt new technologies that help them balance workflows, prioritize orders, and execute warehouse assignments in real time. Thriving in this environment will require innovative approaches to order fulfillment automation and significant upgrades to warehouse execution agility.

In this brave new world of great expectations, the race is on to build the infrastructures needed to fulfill these escalating service level agreements (SLAs). When you consider that fulfilling next-day (and even same-day) delivery requires a four-hour order fulfillment cycle time, distribution center (DC) operators will need new tools and strategies to shorten this window. To compete in this environment, operators need perfectly optimized fulfillment processes from the time an order is received until it’s loaded onto a truck.

E-commerce providers face a volatile mix of challenges, including:

- Real-time visibility into order status, inventory, and fulfillment operations
- Dynamic, automated decision making based on order priorities, labor availability, and automation system status
- Accurate predictions and proactive decisions to avoid congestion and provide optimal balance of all warehouse activities impacting order fulfillment

One can only imagine what the delivery standard will be in five years.
ALL THE ROOM FOR GROWTH WITHOUT THE GROWING PAINS.

Growth doesn’t have to be painful. With smart warehouse automation software, your operations are free to grow wherever your business takes you.
www.intelligrated.com/growth

WHAT CAN A WES DO FOR YOU?
As companies transition more real-time fulfillment optimization functions to a WES, WES software has also advanced to adopt more upstream WMS functions. While the ability to integrate with WMS is often critical to implementing an effective WES, the more dynamic capabilities that a WES can assume, the more agile a company’s fulfillment operations will be.

WES Can Assume WMS Functions

WES Technology and System Integrations

Launches: WES Technology

Order Management

Mobile Phones (ERP)

RF
d
d

Optimized Order Execution

Automation Control

Real-time Decision Making

Congestion Management

Optimized Workflows

Intelligent Routing

Automated Sortation

Real-time Visibility

Business Intelligence

WES Can Assume WMS Functions

WES Functions

Optimized Order Execution
Automation Control
Real-time Decision Making
Order Management
Intelligent Routing
Mobile Phones (ERP)
RF
d

Routing — Carton, tote and item routing based on a license plate number (LPN) are the “bread and butter” of WCS capabilities. A WES impacts larger business flows by tracking the contents within the totes — not just a tote’s LPN — to inform real-time, smart routing decisions based on the next-best destination.

Order prioritization — DCs must continually balance a variety of delivery windows and customer SLAs, as well as both store and direct-to-consumer orders. A WES weighs every factor to determine the most optimal release timing, fulfillment process and execution path.

Order release — A WES accurately predicts order processing time, tracks system capacity, and provides optimal release sequencing to ensure on-time shipment — all while continuously balancing the load on the entire fulfillment system, from picking to shipping.

Labor management — A WES evaluates individual picking rates and tasks in the queue to forecast labor requirements and optimize fulfillment workflows by proactively assigning resources to the areas/zones based on the workload.

ALL THE ROOM FOR GROWTH WITHOUT THE GROWING PAINS.

THE FUTURE IS WHAT WE MAKE IT

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Storage optimization — Fixed storage and slotting allocations are the norm for most DCs — whether automated storage and retrieval systems (AS/RS) or other inventory locations. A WES maximizes utilization while minimizing retrieval time with dynamic storage optimization.

Pick path optimization — A WES determines the optimal sequence of picking-related tasks to maximize picking efficiency, minimize employee travel times, and optimize automated processes based on real-time conditions.

EMPOWER DECISION SUPPORT WITH MACHINE LEARNING

A modern WES utilizes a combination of system data, optimization techniques, machine learning (ML) algorithms and artificial intelligence (AI) to empower a full spectrum of data-driven decision making. It delivers powerful insights that can be grouped into three fundamental categories.

Descriptive/diagnostic — Through data mining and aggregation of historical and real-time data, a WES can generate summaries and present visualizations of activities, also known as business intelligence (BI). This information provides consolidated retrospective reports on which DC operators can base decisions — as daily throughput and labor performance — but does not require ML/AI algorithms to process the data.

Prescriptive — By utilizing ML/AI prediction models to generate forecasts, a WES can empower DC operators with future operational insights in real time. These could include a list of forecasts and their potential outcomes, such as the probability of congestion at a conveyor or pick station. This information allows operators to predict and prepare for various order fulfillment demands and scenarios.

Predictive — Advanced optimization techniques, coupled with ML/AI algorithms, can be leveraged to create dynamic decision-making capabilities, providing operators with a menu of recommendations to achieve specific outcomes. This information then instructs automation equipment, systems and machines on how to proceed with the most optimal tasks. A WES can be configured to make these decisions autonomously or require human review and approval. This gives DCs the option to bypass the need for human intervention when making real-time optimization decisions — to reprioritize, balance operations and meet SLAs — or leave critical decisions in the hands of operators.

PREPARE FOR A MORE PREDICABLE FUTURE

While not all WES software is created equally, Momentum™ WES from Honeywell Intelligrated is equipped with our Decision Intelligence capabilities to deliver the cutting-edge decision support companies need to address the ever-increasing demands of modern fulfillment. Our agile, state-of-the-art software architecture is built with the extensibility to scale with your future needs.

CASE IN POINT: SMART ORDER RELEASE

Let’s look at an example of smart order release and sequencing via a prescriptive type of ML algorithm. The algorithm looks at current orders in the queue and compares potential order sequences to determine which could yield the most efficient and productive results. This calculation evaluates various dynamic factors of the fulfillment ecosystem, such as: the number of orders, the time to complete tasks, picking travel and dwell times, inventory locations, conveyor status, put wall availability and more.

By sequencing orders and releasing them based on the best-case scenario, a WES can significantly reduce unnecessary and inefficient over-processing and deliver substantial financial benefits. Since algorithms are based on exponential equations, there’s no limit to the number of orders the system is capable of calculating, and these calculations grow with the number of orders. What’s more, these self-learning algorithms can detect existing patterns to limit the amount of calculations needed.

SIMULATION RESULTS

Based on assumptions of a typical e-commerce operation, we’ve compared a WES with no intelligence (using first-in, first-out order processing) to simulation models that automate intelligent order sequencing. The results indicate the potential for substantial financial gains, even with the most conservative estimates of KPI improvements:

- Increase throughput by 2 percent = $832k in additional revenue
- Improve on-time shipments by 1 percent = $499k cost savings
- Improve utilization by 3 percent = $295k labor savings

In this scenario, smart order sequencing delivers annual financial benefits of more than $1.6 million.

SMART RELEASE | FACILITY ANNUAL FINANCIAL BENEFITS

▲ $1.62M direct savings

SOFTWARE-ENABLED VALUE

INCREASED THROUGHPUT

Balanced Workload

Reduced Congestion

Lean WIP

Improved Capacity Management

ON-TIME SHIPMENT

Responsive Fulfillment

Dynamic Order Release Based on Priority

Shorter Lead Time

Reduced Replenishment Instalments Through Balanced Workload

IMPROVED UTILIZATION

Revenue Increase Sources

Less Work Reallocation

Less Idling Time

Fewer Number of Touches

Reduced Overtime 1 Percent

Increased Productivity 1 Percent

Assumptions:

4,000 CPH: 2 shifts of 200 workers each: 27 TRS-aided wage: 40 to 42 week/year fulfillment cost $2 linear taxation penalty $2

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OPT IN FOR INDUSTRY INSIGHTS.
THE FUTURE OF DOCK UNLOADING

AUTOMATION FINALLY TACKLES ONE OF THE DC’S TOUGHEST JOBS

Ask any DC operator which task causes the most labor headaches, and you’ll probably get an earful about unloading freight on the receiving dock. Few warehouse jobs are more arduous, repetitive and injury prone. Not only are these jobs notoriously difficult to fill — especially in today’s shrinking labor market — but they also have some of the highest turnover rates in the industry.

While unloading has long been a target for automation, previous approaches have been hindered by performance, integration and cost factors. Today, however, the newest advances in robot control systems, gripping technology, perception and dynamic collision-free path planning are finally making an efficient solution available. Robots can now take on the difficult tasks of loading and unloading freight, meeting or even exceeding manual performance without modification to trailers or nearby workflows.

These innovations come at an opportune time, as supply chains are forced to modernize in the face of increasing pressures from e-commerce. Robotic unloaders and other innovative technologies are more commonly seen as critical to remaining competitive, i.e., lowering logistics costs while enabling DCs to keep up with stricter service level agreements (SLAs).

Other benefits are equally clear. Robotic unloaders relieve workers from arduous and repetitive tasks that are frequently uncomfortable to perform, especially in the extreme temperatures of the summer and winter months. They also eliminate many of the most dangerous jobs, allowing workers to be shifted to more satisfying, higher-value positions.

MATCHING TECHNOLOGY WITH UNLOADING

Finding the technology to automate unloading freight has been a longstanding challenge, mainly because of distribution center (DC) throughput requirements and a variety of package characteristics, including size, weight and type of container.

The industry has seen some attempts to implement automation, such as ergonomic assistance like a conveyor extending into a trailer, and operator-piloted systems that relieve physical burden. However, both of these approaches still require worker supervision throughout the process. This, in turn, fails to address the challenges operations have sourcing labor — a critical need in today’s competitive environment.

Other solutions have emerged that don’t require operator involvement, such as articulated robotic arm unloaders and curtain systems. But each comes with costly trade-offs. Articulated arm systems have speed, maximum size and load limitations, and are not a strong fit for all applications. Curtain systems bring a high risk of product damage and costly, difficult-to-maintain modifications to trailers that are especially challenging when trailer fleets are not under the same ownership.

THE NEXT GENERATION OF ROBOTIC UNLOADING

Combining multiple innovations with decades of material handling experience has led to the development of a next-generation robotic unloader, currently being refined in pilot programs.

These robots from Honeywell Robotics will be among the first to benefit from a common universal control platform that combines improved vision and machine learning-based decision making with advanced motion planning. Known as the Honeywell Universal Robotics Controller (HURC), this cutting-edge robot “brain” has been designed and built specifically for dynamic, unstructured environments like DCs. With extremely rapid data collection and robust processing power, HURC makes it possible for robots to see better, think smarter, and act faster.

By securely handling massive amounts of data in real time, HURC enables unprecedented levels of active perception as well as a reliable autonomy that requires fewer operator interventions, resulting in greater uptime and faster ROI. Cutting-edge recognition technology identifies products, packages, labels and more. At the same time, the robot senses the locations of objects and people to guide efficient grasping and enhance worker safety.

HURC also enables next-generation unloaders to offer full connectivity, allowing them to incorporate advanced machine learning, adapt quickly to new products or packaging, and use data from other robots to improve their own perception and decision making. These enhancements will allow the machines to unload trucks, trailers and shipping containers in less than half the time, while handling products with greater care.

NO NEED TO CHOOSE BETWEEN SPEED AND EFFICIENCY

The robotic unloader achieves the optimal balance of high throughput rates and package care through an innovative design that uses a robotic straddle arm for picking and an articulated nose conveyor for sweeping. Together, these tools are capable of handling diverse case sizes and weights, even from trailers that haven’t been carefully loaded. The unloader can lift items from 1 to 75 pounds, and product dimensions as small as a box of tissues or as large as a washing machine. This range is designed to accommodate the variety of sizes, shapes and quantities typical of e-commerce operations.

The robot’s advanced vision and onboard intelligence enable these tools to be leveraged for maximum effectiveness, with the highest level of precision and capable of improving through each unloading experience. The robots learn from each grasp, using insights from previous attempts to improve methods for handling new products. This machine-learning capability enables the necessary flexibility to handle the speed and variability of modern commerce. Instead of requiring new programming to handle newly introduced products and packaging types, smart robots can compare them to past experiences and continue the cycle of learning and optimization.

HURC, in conjunction with grasping technology, plays another critical role to provide the necessary level of package care, while enabling fast decision making to meet throughput targets. As different products and packaging types can withstand different levels of force, the onboard intelligence can find the “Goldilocks” setting to strike the balance between a secure grip and package preservation. The articulated nose conveyor positions itself to minimize
NEW POSSIBILITIES FOR LABOR AND MANAGEMENT

Robotics capable of fully automating unloading tasks bring a new paradigm to the dock. High performance and flexibility push unloading from a labor-heavy, manual task to an automated, refined process.

This opens up new opportunities for management and employees alike. High-performing DC workers can take on more desirable positions, with relief from unpleasant work conditions. Management gets to replace uncertainty and staffing challenges with a reliable, automated process, with data to fuel continuous improvement.

In addition to reducing the labor requirements needed to maintain or even increase volume, robotic unloaders also help reduce other costs:

- The solution reduces injuries by moving human workers out of one of the most dangerous warehouse jobs.
- Improved employee retention leads to lower rehiring and training costs.
- Simplified labor allocation is made possible by predictable throughput, reducing both the risks of overstaffing and the need for costly overtime.

<table>
<thead>
<tr>
<th>Cases per hour</th>
<th>Labor</th>
<th>Robot</th>
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<tbody>
<tr>
<td>Labor</td>
<td>500–800</td>
<td>1,000–1,200</td>
</tr>
<tr>
<td>Robot</td>
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Labor costs: $65/hr
(assuming $15/hr X 3 employees per container)

Labor cost savings: $112.50–$180 per trailer

Annual savings:
Average of 15 trailers per day, 5 days/week
$438,750–$702,000

The unloader is designed and engineered to integrate into existing infrastructure without any additional support equipment. It works in any standard-sized trailer, with no need for tricky alignment, floor coverings or fleet modifications. When integrated with downstream systems, products are discharged either in a bulk or singulated flow, depending on the facility’s needs.

Ultimately, an automated unloading solution of such comprehensive capabilities dramatically changes the labor equation. If a single operator can supervise four or five fully automated unloaders, your labor burden can effectively be reduced by more than 80 percent — dropping from a crew of eight or nine employees to a single supervisor. Peak performance becomes the norm, sustained through the entirety of a shift, at any time of the year, matching or exceeding manual processes.

As connected infrastructures increasingly become the industry standard, solutions like robotic unloaders will play a critical role in spreading the promise of improved reliability, utilization and productivity to new processes. These solutions lay the foundation for digital transformation, unleashing data to refine and adapt processes to keep up with changing demands and make the most of automation investments.

There’s nothing more reliable than robotics to handle the critical, repetitive work that none of your employees want to do. See the machine-like dependability of our new robotic unloader at www.intelligrated.com/unload.

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THE JOURNEY TO
PREDICTABILITY

LEVERAGING DATA TO ACHIEVE CRITICAL BUSINESS OUTCOMES IN LIFECYCLE MANAGEMENT PROGRAMS

The distribution and fulfillment (D&F) sector has arrived at an operational crossroads in its approach to lifecycle management. On the familiar route, traditional methods of preventive maintenance (PM) programs and reactive responses to issues are providing adequate results and unpredictable consequences. But on the horizon awaits a new direction entirely, one where competitive pressures and profitability targets are driving the need for something well beyond the status quo. This road represents a fundamental shift in the way distribution centers (DCs) and warehouses operate, with a reliance on an abundance of operational data to inform lifecycle management programs.

The fact remains that, despite escalating e-commerce challenges, many DCs continue to run with little to no reliance on the operational data that is readily available to them. Instead, they're content to rely solely on intuition and feel, hoping that they can meet each day’s throughput targets or business objectives. But as consumer service level agreements (SLAs) dictate ever shorter cycle times, this approach doesn’t always deliver their desired outcomes.

Unplanned equipment and system outages can create a domino effect of inefficiencies and potential profit losses — from production downtime and idle labor to delivery/shipping truck delays and disappointed customers. It’s a vicious cycle that, if perpetuated day after day, can silently erode a company’s bottom line.
For these reasons, data utilization is among the most critical issues facing modern DCs. With slim profit margins and soaring consumer expectations, operators simply cannot afford to ignore operational data and expect better outcomes.

**UNDERSTANDING THE VALUE OF DATA**

In other industries, such as the energy sector, data utilization has been built into the culture for more than a decade. From power plant output to oil platform production, these companies analyze every bit of data to squeeze every last scrap of efficiency out of a process. The value of this data is also well-known by the Department of Energy, which reported 10 years ago the potential benefits of data used in functional predictive maintenance programs, including:

- **10X return on investment**
- **25–30 percent reduction in maintenance costs**
- **70–75 percent elimination of equipment breakdowns**
- **35–40 percent decrease in downtime**
- **20–25 percent increase in production**

But DC operators have been much more skeptical about the operational impacts of data, and therefore much slower to embrace data-driven ecosystems. McKinsey reports that in the retail sector, only 30–40 percent of the potential value of data has been captured. In a related supply chain industry report, nearly two-thirds of companies confess to not utilizing any technology to monitor their supply chain performance.

However, it’s safe to assume that pure-play e-tailers are among the one-third who have adopted data and digital technologies to drive productivity. For one, they’re often held to the highest standards and SLAs and can’t afford to make mistakes. But they also don’t have the luxury of access capacity in their systems — especially during peak seasons — and are engaged in a never-ending pursuit to improve facility optimization.

For smaller operations and technology laggards alike, the notion of continually collecting data and applying automated analytics to it is new. In most cases, these stakeholders don’t understand how data-driven, actionable insights could deliver measurable results and daily operational improvements. But on closer examination, these benefits are relatively obvious:

- Running one shift instead of two
- Preventing downtime with the addition of machine sensors
- Optimizing individual and networked DCs with deep operational visibility

What’s more, the idea of acting on those insights in real time, during production, is simply not an option in their playbooks. To make a culture shift toward embracing data, the D&B sector must first understand its vast potential to deliver long-term value in their operations.

**MOVING THE UPTIME NEEDLE WITH PREDICTIVE MAINTENANCE**

The use of data can significantly impact DC uptime. Not only is uptime vital to meeting daily throughput targets and gauging overall operational effectiveness, but it’s also an area where traditional lifecycle management strategies fall short. At issue is the way in which maintenance operations are conducted, specifically the need to transition from the strategies of “react and respond” to “analyze and predict.”

Indeed, by adopting predictive maintenance technologies, DCs can reduce the amount of unplanned operational disruptions they experience — and potentially even eliminate them. This prospect isn’t nearly as far-fetched and futuristic as one may think. By simply connecting machine-level sensors and control system data to a robust analytics software platform, operators can immediately reap the benefits.

Once in place, these connected infrastructures help DC operators keep their systems running at peak productivity levels — continuously accumulating data on equipment and system conditions to provide real-time statuses and insightful analytics of overall system performance. Advanced machine learning (ML) algorithms detect equipment degradation and process inefficiencies to quickly identify conditions that could inhibit productivity or cause unplanned downtime.

What’s more, DC operators don’t need to be data scientists to benefit from these insights. Information is easily accessible through live performance dashboards and alerts that operators can access from anywhere and at any time for:

- Real-time notifications of issues affecting an asset or process
- Actionable insights to improve productivity during production
- Visualizations of key system parameters and metrics along with historical data trends for optimizing maintenance and operations
- Predicting and avoiding unplanned downtime

THE BUILDING BLOCKS OF OPERATIONAL SUCCESS

Uptime is not the only metric of success. Every business and DC has its own set of critical business outcomes upon which they’re continually measured. Whether it’s simply a matter of hitting daily throughput targets, maximizing labor productivity or increasing annual profits, each operation has defined objectives it must meet.

From a lifecycle management perspective, achieving these goals requires the ability to address the fundamental building blocks of operational success. Whether companies choose to accept these responsibilities themselves or partner with a lifecycle services provider — such as an original equipment manufacturer (OEM) — each of the following building blocks must be present to achieve critical business outcomes.

1. **DATA VISUALIZATION AND ANALYTICS** — Leveraging data is essential for companies hoping to achieve continuous operational improvements. Much of this data already exists within control systems and simply needs analytics tools and visualization software to deliver real-time production insights.

2. **RESIDENT TECHNICIANS AND SUPERVISORS** — Modern DCs comprise complex systems and automation technologies. An on-site staff of qualified technicians is imperative to ensure smooth, reliable operations.

3. **SPARE PARTS MANAGEMENT** — A robust spare parts management program is essential for delivering efficiently planned and corrective maintenance activities.

4. **24/7 TECHNICAL SUPPORT** — Technicians need access to expert OEM support to help troubleshoot issues and accelerate equipment repairs and issue resolution.

5. **TECHNICAL ADVISORS** — Individuals with extensive facility experience and equipment expertise are needed to troubleshoot and advise the best course of action on a given piece of equipment or technical issue.

6. **FIELD ENGINEERS** — A core of field engineers is helpful for bolstering an on-site staff in a variety of situations, such as accelerating preventive (planned) maintenance processes or identifying flaws in a system’s design.

7. **ASSET MANAGEMENT ASSESSMENTS** — DCs must have periodic assessment programs in place to evaluate both equipment and operational performance. Assessments are essential for developing multi-year, asset management plans to allow for modifications, upgrades and obsolescence.

8. **ENGINEERING CENTER OF EXCELLENCE** — As the needs for modifications and upgrades are identified, this team of engineers can help ensure proper design and implementation of these improvements.

9. **TRAINING** — With continuous industry growth, high attrition rates and a shortfall of qualified technicians, the need for training is more critical than ever. Training helps enhance your existing technician skillsets while aiding in the recruitment process.

Only with all these lifecycle management building blocks in place is it possible for companies to consistently achieve their critical business outcomes — even if the goal is 99.9 percent uptime.
ON THE MOVE
2020

DC OPERATORS DON'T NEED TO BE DATA SCIENTISTS TO BENEFIT FROM THESE INSIGHTS.

THE JOURNEY TO PREDICTABILITY

ADOPTING A DATA-FRIENDLY CULTURE

For those companies or operations that have been slow to adopt data, the good news is that they can quickly catch up to (or surpass) their competitors. But doing so will require a fundamental cultural change. The power that this data represents can be perceived as a threat to employees and stakeholders alike, many of whom are either content with the status quo or fear a disruption in their standard modes of operation.

To help make the transition to a data-friendly culture, companies should consider the following best practices:

1. ESTABLISH TRANSPARENCY — Give everyone in the company access to the same data so they can A) gain visibility to the insights, and B) contribute to the problem-solving process.

2. PROMOTE CROSS-FUNCTIONAL TRUST — Transparency will inevitably bring issues to the surface. Rather than focusing on recrimination and creating a culture of fear, it’s essential for all departments to build trust and work together on resolutions.

3. ALIGN THE ORGANIZATION TO BUSINESS OUTCOMES — Once business outcomes have been clearly defined, leadership must make sure that everyone in the organization is working to achieve them. This also means everyone must understand what has value and what does not.

Like any new technology or process, introducing the use of data in a transparent and automated way will require some degree of change management in order to ingrain it into standard procedures and ultimately, leverage it effectively.

At Honeywell Intelligrated, we’re creating the tools to help companies embrace data utilization in their lifecycle management programs. Not only do we provide our customers with the building blocks to success, we’re helping them integrate our foundational connected solutions to deliver the insights needed to achieve their business outcomes.
Distribution centers (DCs) and warehouses are busy places. They now handle an average of 13,985 SKUs, up nearly 7 percent in 2018 from the previous year. In response, DC and warehouse operators are turning to automated storage and retrieval systems (AS/RS) that integrate with advanced software called warehouse execution systems (WES). Together, the technologies can help DC and warehouse operators keep up with the ever-increasing volume and velocity of orders across traditional channels as well as booming e-commerce and omnichannel fulfillment.

AS/RS also can improve picking accuracy and help operators of DCs and warehouses deal with chronic labor shortages. What’s more, strong business growth, fueled by e-commerce and omnichannel requirements, has driven investments in AS/RS to augment goods-to-operator (GTO) processes, in which automated shuttles pick totes from racks and deliver products to people at picking stations. There’s a strong business case to be made for this approach. Advanced shuttle AS/RS can improve throughput by a factor of 10 compared to other technology.

WHAT’S NEXT: ADOPT AS/RS TO IMPROVE PICKING ACCURACY AND SPEED

**FOUR REASONS WHY DISTRIBUTION CENTERS INVEST IN AUTOMATION**

Why do DC and warehouse operators invest in automated GTO systems? Based on their experiences, here are four of the biggest reasons:

1. **RAPID GROWTH IN ORDER VOLUME AND VELOCITY**

Without automation, more human pickers are needed to keep up with increases in SKU quantities. At some point, the number and frequency of orders expand to a level at which DCs have too many people walking up and down aisles. The congestion begins to impact the time required to pick orders.

2. **INVENTORY MANAGEMENT**

Inventory management systems ensure that inventory is available as needed by customers, often with automated picking systems. These systems track inventory and monitor usage to maintain optimal levels.

3. **PRODUCTION PLANNING**

Production planning systems are used to plan and schedule production activities to meet customer demand. They ensure that production is aligned with demand and that the right products are produced in the right quantities at the right time.

4. **PRODUCT SEQUENCING AND BUFFERING**

Product sequencing and buffering systems are used to manage the flow of products through the warehouse. They ensure that products are sequenced in the correct order for efficient picking and that sufficient inventory is held as a buffer to meet demand.

**SHUTTLE AS/RS DEFINED**

Automated material handling with shuttle AS/RS technology offers the flexibility and speed to handle applications ranging from e-commerce and omnichannel fulfillment and has a wide range of other uses in distribution centers, retailing and manufacturing. AS/RS capabilities include:

- **GTO fulfillment** — Combines shuttles with conveyor systems and lights or voice picking to reduce human walk times and improve efficiency
- **Inventory management** — Responds to better inventory control while minimizing loss
- **Mixed-load, full-case and break-pack fulfillment** — Manages inventory to support advanced processes that meet customers’ ever-changing orders
- **Product sequencing and buffering** — Deliver the right products and quantities
- **Route-based sequencing** — Optimizes truck load patterns for faster, more efficient deliveries
2. POPULARITY OF GROCERY E-COMMERCE
Grocery retailers offering click-and-collect services reach a point where they want to improve speed and efficiency by implementing micro-fulfillment systems that can relieve pressures on in-store inventory and staffing. AS/RS can be added inside existing stores, DCs and dark stores to support e-commerce pick-up and home delivery.

3. HIGH-VALUE AND HIGHLY REGULATED PRODUCTS
Accuracy rises to the top of the priority list when picking expensive SKUs and items required to be tightly controlled, e.g., medical devices, pharmaceuticals and alcoholic beverages. Any order error is magnified by the cost of re-picking when access to the products is restricted, in addition to the risk of regulatory penalties and fines.

4. NEED TO EXPAND CAPACITY
Winning budget approval to add square footage to DCs (let alone for new construction) is always a tough sell. Increasing existing footage to DCs (let alone for new construction) requires an investment in new software or filling up the vertical space inside the DC cube. Most significantly, AS/RS can provide companies with a long-term solution to the shortages of qualified labor across markets.

The flexibility of AS/RS makes it possible to integrate them with a variety of picking technologies, including GTO and goods-to-robot (GTR) solutions. In applications with strict compliance requirements or the need to secure high-value products, AS/RS can be used in conjunction with other picking technologies. For example, AS/RS can work with enclosed A-frame systems for picking small items such as bottles, blister packs and boxes.

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3. COMPLEX ORDERS BUILD THE CASE FOR AS/RS AUTOMATION
More DC operators will consider automation to keep up with business growth as well as the demands for efficiency and accuracy. Material handling also has grown in complexity. Retail stores replenish their shelves with more split-case orders. This shift replaces full pallets with more frequent, smaller-quantity orders. In turn, the retail shift to e-commerce fulfillment requires significantly more labor for picking and sorting if a DC isn’t highly automated.

Designing and implementing AS/RS to meet volume and complexity requirements take time. The more sophisticated the requirements, the longer it can take from the consideration phase through to the go-live phase. Expect an automation installation to take at least 18 months once equipment has been ordered. Additional time is required for the preliminary evaluation and consultative process, which can be conducted by either independent engineering consultants or process design experts from the automation vendor you select.

Choosing off-the-shelf AS/RS can accelerate the implementation timeline. However, when DC operators need automation that can scale with their business, they should consider an engineered AS/RS.

4. HOW TO EXPAND WITH AS/RS
Scalability is a key advantage to AS/RS compared to older material handling technologies. If DC operators are considering adding inventory and thus need more storage, AS/RS racks and shuttles can be added to the length, width or height of the cube. If more throughput is needed, DC operators can add shuttles or another aisle.

As the technology advances, GTO picking stations will become even more automated, including through the addition of robotic systems that pick collaboratively alongside humans or replace human pickers altogether.

When additional DC capacity is required to meet future demands, DC operators have multiple options from which to choose to expand their AS/RS:

• Add aisles or levels and GTO stations to make full use of the floor space and height inside the DC cube.

5. FUTURE-PROOF MATERIAL HANDLING PROCESSES
Operators of DCs and warehouses have started to address escalating volume, velocity, costs and the chronic workforce shortage by investing in shuttle AS/RS technology. They can rely on AS/RS to handle high volumes of smaller, lighter loads in cartons, trays, totes or bins. Shuttle AS/RS can also provide flexible storage configurations and enable businesses to avoid the cost of constructing additional warehouse space. Most significantly, AS/RS can provide companies with a long-term solution to the shortages of qualified labor across markets.

6. CONSIDERATIONS FOR AS/RS AUTOMATION
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FOOTNOTES

UPCOMING 2020 EVENTS

FEBRUARY 23–26
DALLAS, TX
LINK Retail Supply Chain Conference (RILA)

MARCH 9–12
ATLANTA, GA
MODEX

MARCH 10–12
STUTTGART, GERMANY
LogiMAT

MARCH 31–APRIL 1
COVENTRY, UK
IntraLogisteX

APRIL 16–17
CHICAGO, IL
NextGen Supply Chain Conference

SEPTEMBER 28–30
NASHVILLE, TN
Parcel Forum

NOVEMBER 8–11
CHICAGO, IL
PACK EXPO International
THE SCIENCE OF LABOR PRODUCTIVITY

DATA IS HELPING DCS CUT LABOR COSTS, BOOST PERFORMANCE, AND RETAIN WORKERS.

Imagine for a moment that you could know exactly how many workers you’ll need to run your operation at peak efficiency next week. While you’re at it, assume that it’s also possible for you to know exactly where each of your employees will work most effectively, which incentives will motivate them to get their jobs done, and who’s thinking about quitting next week.

This scenario isn’t as far-fetched as it may sound. In fact, all of these insights are possible, thanks to recent advances in data science, enabled by the development of cutting-edge artificial intelligence (AI) and machine learning.

By incorporating these capabilities into next-generation labor management software (LMS) systems, connected distribution centers (DCs) can now harness an unprecedented level of proactive control over their workforce — and their operations. How DC operators choose to use this power will have a significant impact on the industry. Early signs suggest that savvy DC operators are using it to discover new opportunities for optimization, overcome the challenges of tight labor markets, and drive the development of autonomous systems.

THE DECLINING COST OF LMS

One of the most promising benefits of modern LMS systems is their plummeting cost, which is making them accessible to more operations than ever before.

A significant part of an LMS setup is the development of engineered labor standards, which provide the benchmarks for each individual task in a DC. Historically, this process has been performed by a team of industrial engineers, which can be both costly and time-consuming.
These capabilities provide additional cost savings by relieving industrial engineers of back-end work, effectively giving them more time to invest in higher-value tasks, such as developing new process improvements. In many cases, it also eliminates the need for DCs to hire additional staff in order to manage the system itself.

FORESEEABLE FUTURES

During the last decade, the focus of LMS has gradually shifted from interpreting the past to predicting the future. About 10 years ago, the insights of LMS were largely limited to the previous day’s performance, highlighting which areas were meeting their goals or needing improvement. Details started coming faster as LMS evolved, providing information about the previous shift, or even supplying iterative updates once or twice during the current shift. This data had value—and it still does—but for the most part, it only enabled reactive responses to past results.

Fast-forward to today. With the advent of advanced machine-learning algorithms, LMS systems can now use this historical data to predict a DC’s future labor needs.

For example, a DC’s execution history can be used to predict resource needs for the next day or the next week. In addition, these plans can be supported by real-time data monitoring and predictive modeling. In a scenario like this, the LMS might notice that there are too many workers concentrated in one area while another will soon have a shortage. If the potential benefit of reassigning workers outweighs the opportunity cost of moving them, the system could automatically reassign them.

Each organization can choose the engagement incentives it’s willing to offer. Even simple, low-cost strategies like badges, pizza parties, or an extra day off can pay big dividends when it comes to employee satisfaction and retention. The system can also predict which workers are most likely to respond to more substantial incentives, such as bonuses, training, or career development.

LMS systems can now use this historical data to predict a DC’s future labor needs.

GREAT POWER CREATES GREAT OPPORTUNITIES

Another emerging benefit is the ability to predict labor attrition. Drawing on years of historical data from multiple facilities worldwide, machine-learning algorithms can track employees from their start date, as they transition to new roles, quit, get fired or laid off, and so on.

Once the model gains enough local data from a given site, it’s capable of identifying risk factors that signal when a worker is at risk for quitting. Local data is key, because what workers do differently before they leave can vary by organization, and even by location within the same organization.

While this is not exactly a “crystal ball,” early tests suggest the turnover of any given individual can be predicted with accuracy rates around 95 percent after the model has been programmed. The same machine-learning model can also be used to help pinpoint factors that are encouraging or discouraging employee retention, such as which supervisors are managing the largest number of satisfied employees, and what their peers could be doing to improve their own rates.

Early adopters are using this powerful information with varying degrees of sophistication. Some companies simply use this kind of data to automatically fire workers with the highest risk scores in a kind of “preemptive strike.” This strategy may eliminate some problems before they escalate, but it also overlooks the greater levels of value the data can provide. Considering today’s tight labor environment—which shows every sign of getting worse long before it improves—this approach may also be short-sighted.

DESIGNING ENGAGEMENT MODELS TO KEEP GOOD WORKERS

A more enlightened approach is to use risk data to inspire and engage the workers you’d like to retain. The powerful outputs of data science can be used to drive resource-focused engagement, creating measurable improvements for both workers and the warehouse.

Many factors determine which engagement models will appeal most to a given worker. For example, baby boomers typically prefer monetary incentives, while many millennials value non-monetary perks such as extra time off. Other factors that often influence engagement models are an employee’s performance level, tenure, utilization, operation and current risk score.

For example, let’s say that your LMS system identifies a group of employees who are likely to quit in the next six weeks. Based on each individual’s unique risk factors, you could divide them into three groups:

- **Red:** Employees with high turnover risk, low performance records, or both
- **Yellow:** Medium-risk workers with moderate to high performance levels
- **Green:** Similar to the yellow group, but with lower levels of risk

Next, each group can be approached with tailored engagement models. Members of the red group are either unlikely to stay (regardless of incentives), or lack sufficient potential for engagement to be worthwhile. This group could be monitored, and supervisors can begin contingency planning for their specific roles, but the primary insight in their case is that they’re unlikely to stay. By contrast, the green group doesn’t need much encouragement to stick around. Their engagement model could include some standard training or a bit of extra attention.

Attrition prediction offers the most value when considering members of the yellow group. The effort needed to retain them could include more intensive training, larger incentives, or other motivation such as making sure some type of intervention is used to avert a labor shortage. The system can help determine which incentives are likely to work best, balancing their cost against the likely benefits.

These investments are easily justified when you consider the costs of recruiting and retraining replacements. If just 1.5 percent of workers in the green and yellow groups can be persuaded to stay, a medium-sized DC could easily see six-figure savings each year.

 Needless to say, the system also monitors the results of all these initiatives. With properly engineered labor standards and engagement models, early tests suggest that for every 50 cents employers invest in engagement, they should expect to see about a dollar in throughput benefits.

At Honeywell Intelligrated, our labor management experts are currently conducting testing to further refine the effectiveness of attrition prediction. Machine learning plays a key role in shaping these models, balancing them with the aid of historical information. Once programmed, the system works to ensure a curve that drives performance, predicts the best incentives to offer, and helps determine the standards an organization should set as its goals. Going forward, it also monitors these and many other factors, suggesting changes as needed to maintain peak efficiency.

THE POWER OF A SINGLE PLATFORM

LMS systems thrive best when the information they need is driven through a single consistent platform. With the proper integration, more data can be pulled in real-time and process improvements can be implemented with greater speed and efficiency.

This is particularly true in the case of labor balancing, which requires the LMS system to have a real-time view of current resources and capacity. Seamless LMS integration into a connected infrastructure allows rapid calculation of opportunity costs and makes it easier for the system to redirect resources when and where they can provide the greatest benefit.

While some of the capabilities described in this article are relatively new, they’re already delivering significant competitive advantages to forward-looking DCs. From lower costs to higher throughput rates to more engaged workers, the evolution of data science and sophisticated machine learning is opening new frontiers for LMS systems.
AMERICAN CONSUMERS HAVE CRANKED THE VOLUME ON ONLINE SHOPPING UP TO 11, PUTTING INTERNET RETAILING AT THE CENTER OF THEIR SHOPPING STRATEGIES YEAR-ROUND.

An NPR/Marist poll found that 69 percent of Americans have purchased an item online, 84 percent have bought clothes or shoes online, and 88 percent like the convenience of 24/7 shopping for any product.

Those points continue to drive continuous and significantly higher growth rates in e-commerce sales, according to the U.S. Census Bureau. Its most recent statistics, from the first half of 2019, showed a 13.3 percent increase ($146.2 billion) in 2019’s second quarter over the same period in 2018 — a pattern that’s been repeated quarter-after-quarter throughout the past decade.

Simultaneously, competition for consumers’ online dollars is intensifying, specifically as Amazon, Target and Walmart remain locked in a new three-way battle to win customers through same-day delivery services. Therefore, all distribution operations must be able to, well, deliver in order to keep up. Forbes reports that a full 75 percent of shoppers expect all brands to offer same-day delivery within the next 12 months. Translation? Having the capacity to support an expanding, diverse inventory, error-free fulfillment, and fast, free delivery options is no longer optional in the e-commerce world. It’s table stakes.

Now is the time for e-commerce retailers to sort out their plans for handling this dual challenge of online sales growth and meeting customer expectations for fast, accurate delivery. To remain competitive, operations must find ways to handle as many individual orders as possible, simultaneously. Fortunately, this is exactly where automated sortation solutions excel.

Automated sortation solutions consolidate, separate and route individual items and orders to their unique destinations at maximum throughput rates — and the market offers plenty of choices. Although all these systems merge, identify, induct, divert and convey products to specific destinations, finding the best-fit automated sortation solution to deliver the accuracy, efficiency and flexibility necessary to remain competitive requires a thorough review of operational requirements and the automated sortation system options available. The evaluation process should include three key steps:

1. GATHER KEY INFORMATION ABOUT THE ORDERS.
   
   To help determine the optimal solution, facility management must know the following benchmarks: total number of orders handled per day; ratio of multi- to single-line orders; and the outbound packaging types used and their degree of dimensional consistency (or inconsistency).

2. DETERMINE THE INTENDED OUTCOME OF THE SORT.
   
   Certain sortation processes facilitate more effective order consolidation. This common order fulfillment process drives greater picking efficiency — yet requires a system with a large number of sort destinations in a limited space. This plays to the strengths of loop sortation technology, in which individual load carriers receive items from multiple input points. The items continuously recirculate while awaiting other picks required by the same order to arrive prior to pack-out. Depending on the deployed technology, load discharge occurs in a variety of ways:
   - A bomb bay sorter has carriers with two surface halves that drop open from below.
   - Tilt-trays tip to one side or the other.
   - Push-trays are equipped with a mechanism that pushes the load off the surface.

3. SELECT THE AUTOMATED SORTATION SOLUTION.
   
   While the first two points are important, the wider adoption of smaller, more malleable packaging types (such as envelopes, polybags and bubble mailers) for direct-to-consumer shipments is often the most critical factor in system selection. Implemented in response to the introduction of widespread dimensional weight pricing by carriers, these lighter-weight packages cost less to ship, but create additional catch points that increase the chances of sortation conveyor jams or sortation loop recirculation.

   Their use varies by operation, but modern fulfillment centers should consider the degree to which they currently (or will increasingly) handle a mix of malleable polybags, rigid corrugated cases and flexible bubble mailers. This means deploying a sortation system capable of reliably handling the unique challenges of all packaging types.
accommodate appropriate spacing between parcels to facilitate data capture during transport and handling (so that items can be sorted to the correct destinations) is key. Recent innovations in these types of sortation functions enable higher throughput without a corresponding increase in equipment speed — which ultimately reduces wear, energy usage and noise, for a better long-term investment. Of course, as with most equipment purchases, the more complex the technology, the greater the cost.

STRATEGIES TO GET SORTATION SYSTEMS ONLINE QUICKLY

Getting an automated sortation system up and running fast depends on a variety of factors, some of which can be controlled by the end user and some of which cannot. These include:

- **Sortation vendor pipeline:** Leading systems suppliers typically have a deeper manufacturing and engineering bench for capacity fluctuations.
- **System complexity:** Custom engineering and integration take time, so less customization means faster deployment schedules.
- **Vendor consolidation:** Working with a single-source provider (instead of multiple outside consultants and equipment vendors) offers significant speed advantages.

COMPLEX CHALLENGES REQUIRE AN EXPERIENCED PERSPECTIVE

Today’s e-commerce driven supply chains have little margin (or time) for error. In a DC, the relentless pace of order fulfillment and intense competitive pressures are forcing operations to squeeze out as much sortation capacity as possible. Selecting a best-fit sortation solution requires considering the unique characteristics of both the operation and available technologies. To ensure the successful design and implementation of an innovative sortation package that meets your specific operational goals, partner with an experienced provider who has access to — and experience with — integrating a full lineup of sortation technologies.

**Cross-belt carriers** have a short section of motorized belt conveyor oriented perpendicularly to the sorter’s travel direction that propels the item off to the side. The other common sortation application is routing of order packages to different shipping trailers based on service level agreements or carrier arrangements. This type of workflow transports orders from pack-out to shipping, then diverts the items to different destinations at the outbound deck. To efficiently accommodate a high number of destination locations, outbound sortation usually uses line sorters which travel in a straight line with a single induction point.

As directed by an automatic identification technology — such as a barcode scanner or imager — items are pushed, diverted or deflected off the sorter’s path at appropriate points by means of a mechanical arm or other in-line device. Common line sortor technologies include sliding shoe (in which a series of divert shoes slide diagonally across a surface of continuously linked slats to contact the parcel and push it gently off the main conveyor line), motor-driven roller (MDR) transfers and diverts, strip belt transfer, pop-up wheel belt, pop-up wheel strip belt, or sweeper sorters.

3. **ESTABLISH THE DESIRED THROUGHPUT RATE OF THE SYSTEM.**

With high e-commerce order volumes putting stress on the capacity of existing systems, knowing an operation’s throughput rates at both standard and peak periods is integral when selecting the most optimal automated sortation technology. Throughput rates can fuel return on investment calculations, as well as provide room for operations to scale for the future — an important factor in maximizing long-term value.

Do not, however, equate throughput to speed; rate of travel alone means nothing without proper product gapping, gentle handling and accuracy. Ensuring that the system can
As a direct result of Honeywell’s acquisition of Transnorm, our customers have gained access to a variety of best-in-class, high-performance automated conveyor and sortation components that smoothly and deftly maneuver items around curves, through direction changes, and up and down differing elevations within facilities. Transnorm’s belt and roller modules are used to handle totes, cartons, bags and parcels in distribution centers (DCs) and courier/express/parcel (CEP) sortation facilities, as well as baggage in airports worldwide.

The addition of its product lines for high-speed, singulated loads in applications ranging from 2,000 to 50,000 parcels per hour greatly enhances Honeywell Intelligrated’s current offerings to these key markets — particularly those in omnichannel and e-commerce retail. Indeed, Transnorm’s modules have been installed in greenfield construction projects for Amazon, FedEx and UPS, as those operations have expanded their geographic presence within the U.S. They’re also frequently utilized in brownfield modernization projects to automate existing facilities, such as those owned and operated by Home Depot and Family Dollar.

Transnorm’s global footprint spans three continents, with production facilities in Arlington, Texas; Harsum, Germany; and Bangkok, Thailand. For more than 50 years, the brand has been providing curve belts, angled conveyor merge junctions, powered and gravity spiral chutes, sorting modules and other technologies. U.S. airports have relied on Transnorm’s solutions since the 1970s; distribution, fulfillment and parcel facilities have been integrating these solutions since the 1980s.
With more than 40,000 installations in the U.S., Transnorm’s modules utilize low-friction drives that are extremely quiet, highly energy-efficient, and require 75 percent less maintenance annually than competitive, chain-driven components. Owners of these systems can expect at least a 30 percent reduction in their overall total cost of ownership (TCO) compared to competitive technologies.

Because every installation is unique, Transnorm’s engineering and design teams customize each product to meet the individual needs of the application. Each design leverages standard, patented elements unique to the brand. The Transnorm team works with every customer to define their requirements — including belt length, width and curve diameter, junction angle and other specifications — and complete project drawings within 48 hours. James McKenna, general manager for Transnorm America, reported that the majority of projects are typically completed in four weeks, from initial order to shipment.

“As it turns out, there are no straight lines in facilities or conveyor installations,” he noted. “That’s why each of our products are custom designed for each application. But because of our robust design and engineering department, and the ability to modify our standard product offerings to accommodate these differences, we can provide these extremely rapid turnaround times for all our customers, including those in the U.S.”

TRANSNORM’S SOLUTIONS PORTFOLIO
Transnorm’s belt and roller conveyor and sortation modules are energy-efficient, scalable, quiet and delivered in four weeks. Key solutions in the U.S. portfolio include:

- **Curve conveying** — TS 1500 Powered Belt Curve for flat, incline, decline and spiral stack configurations; capable of moving 40-pound loads at speeds up to 600 feet per minute
- **Gravity conveying** — SafeGlide® Spiral Chute uses gravity to move boxes and bags over its low-friction, tapered fiberglass surface; the Channel Spiral Chute also uses gravity to move totes and mail trays
- **Continuous vertical conveying** — The powered Spiral Tower can be used as either an incline or a decline, moving loads up or down at speeds up to 200 feet per minute
- **Merges and diverts** — The TS4200 full-belt merge or diverter comes in 30- and 45-degree angles at speeds up to 600 feet per minute; redundant surface strip belt conveyors equal that performance at 20- and 30-degree angles
- **Timing conveyors** — TS1400 Q-Conveyors separate and queue up unique cartons and parcels, creating even gapping
- **Multi-line merging** — TS4100 Mega Merge modules feature bilateral belts and deflectors for high-speed, contactless line merges
- **Vertical merges** — The VertSwitch™ merges or diverts loads up or down in a compact footprint
- **Multi-directional sorting** — TS4800 Mod Sort conveys, merges, queues and diverts different loads with 90 degrees of total articulation for dual left-right sort points
- **Line splitting** — TSM SmartSort™ Line Splitter diverts loads at high speeds to multiple outfeed junctions
- **Vehicle loading/unloading** — SOVEX telescopic conveyors extend and retract from inside a trailer to facilitate hand-stacked loading or unloading at the dock

TRANSNORM BENEFITS AT A GLANCE
- Lowest noise levels thanks to low-friction drives that generate high speeds (up to 600 feet per minute) at conversation levels of 68 decibels
- High energy savings from low-friction designs and modules; power requirements are 50 percent less than comparable chain-driven units
- Minimal preventive maintenance costs, thanks to 75 percent less frequent service requirements with no parts removed to complete
- 30 percent lower TCO
- Reduced installation costs with pre-assembled components

NEW SOLUTIONS DEBUT IN THE U.S.
Two new portfolio solutions have recently debuted within the U.S. market: Transnorm Sorting Modules (TSM) and Telescopic Conveyors.

Created expressly to reduce the installation time associated with conveyor and sorter projects, the TSM solution is targeted to CEP facilities seeking to better handle rising parcel throughput volumes, increasing demands for next-day delivery, and exponential e-commerce growth.

As a plug-and-play portfolio of modular, easy-to-install and scalable automation components, the core of a TSM installation is the SmartSort Line Splitter. Reliable and robust, it quickly and accurately diverts even the smallest polybags or cardboard boxes to angled junctions branching off the main conveyor. These multiple outfeed junctions then connect to chutes, gravity runoffs or telescopic boom conveyors for trailer loading.

Because the TSM system is compact and adaptable, it can be deployed in facilities that lack the floor space for a sorter installation at a lower cost, while still delivering high throughput volumes, fast switching times, and significantly reduced distances separating each parcel.

Also new to the U.S. market, Transnorm’s SOVEX Telescopic Conveyor line supports personnel as they load or unload trailers of loosely stacked boxes, parcels, totes and cartons. Located at the inbound and outbound dock doors, these boom conveyors extend in length telescopically, reaching into the trailer to minimize the number of steps an associate must make during loading or unloading.

The unit’s conveyor belts run in two directions, allowing receipt of loads from the vehicle or for sending items into the trailer; the associate only has to pick up or place the load. These telescopic conveyors can be integrated as a fixed, traversing or completely mobile unit, depending on the size of the facility and the volume of inbound and outbound trailer loading.
ON THE MOVE

OVERVIEW

Coastal Pet Products Inc., an Alliance, Ohio-based manufacturer of collars, leashes and harnesses for cats and dogs, produces 14,000 to 16,000 SKUs. Established in 1968, the family-owned company is an industry leader known for being among the first to incorporate double-ply nylon webbing in its designs. Coastal Pet Products also supports its highly automated manufacturing processes with proprietary machinery designed in-house.

To improve picking and inventory replenishment — and ensure consistent on-time delivery to retail stores and e-commerce customers — the company’s warehouse and business systems managers sought to upgrade their technology platforms. This included migrating to the latest enhancements in voice software and mobile devices that would maximize the benefits of voice-guided workflow, such as: productivity, accuracy and consistent on-time delivery.

BACKGROUND

More than a decade ago, Coastal Pet Products partnered with Honeywell to implement voice-enabled automation in its warehouse. The robust solution enabled Coastal Pet Products to transition to a paperless picking process and gain greater operational visibility and control — all while greatly improving worker productivity, accuracy and safety.

While their warehouse management system (WMS) communicated with the voice system, its ability to provide inventory status updates and visibility to other operational key performance indicators (KPIs) was limited in scope and timeliness. To maintain shipment accuracy and on-time delivery while increasing the volume and velocity of orders, the company decided in 2017 to invest in a more advanced WMS. At the same time, Coastal Pet Products also began considering how to upgrade its voice technologies. The company set the following operational and financial goals for the project:

• Reduce training time required for seasonal workers to learn the voice system
• Speed up picking by overcoming the noisy warehouse environment
• Avoid labor costs for overtime
• Expand real-time insights into inventory and operations
• Support retail fulfillment while scaling e-commerce fulfillment

SOLUTION

Enhancing Order Fulfillment Processes to Keep Up With Growth

The upgraded Honeywell Voice system improved Coastal Pet Products’ already high-performing order fulfillment processes.

To meet increasing requirements, the company replaced older wired and wireless headsets with SRX3 wireless headsets, the next generation in Bluetooth® wireless headset technology. The SRX3 headsets are ideal for noisy distribution centers (DCs) and warehouses because they utilize the latest advancements in speech recognition technology. They also offer long battery life in every operating environment and a shareable component design.

To support mobile workers with faster picking and inventory replenishment directions, Coastal Pet Products invested in A720x voice-enabled mobile devices. The wearable devices enable the Honeywell Voice system to deliver hands-free and eyes-free efficiencies via intuitive and ergonomic technologies. A720x Series devices support simultaneous use of Bluetooth-enabled headsets, scanners and printers.

REDUCE TRAINING TIME AND RAISE PRODUCTIVITY WITH HONEYWELL VOICE

QUICK FACTS

Honeywell Solution
• Honeywell Voice
• Customer: Coastal Pet Products Inc.
• Location: Alliance, Ohio
• Industry: Pet care
• Website: www.coastalpet.com

Customer Results
• Improved productivity
• Reduced labor costs
• Lowered training requirements
• Increased picking speed
• Enhanced visibility

Why Coastal Pet Products Chose Honeywell
• Company has been a Honeywell Voice user for more than a decade
• Previous Honeywell Voice devices improved shipment accuracy to 99.9 percent
• Honeywell Voice seamlessly integrates with third-party WMS
• Voice technologies improved operational efficiency and profitability
In 2018, Coastal Pet Products tested 15 of the devices combined with SRX3 headsets to determine whether workers could hear more clearly while walking through the racks and next to conveyors. Based on proven improvements in audio quality as well as how quickly the system communicates order information, the company bought another 42 of the A720x mobile devices to equip every worker on all shifts.

Honeywell Voice seamlessly integrates with Coastal Pet Products’ new third-party WMS to provide advanced data collection, automated documentation and analytics capabilities. The company now has access to real-time insights into inventory, order status and productivity.

WHAT VOICE-ENABLED WORKFLOW LOOKS AND SOUNDS LIKE

Pickers can work on two or three orders at a time, guided by Honeywell Voice to locations in the warehouse based on bin and rack height. Workers pick the number of items as directed and place items in totes. They scan RFID numbers, which are communicated to the WMS. The WMS then directs conveyors to deliver orders to packing stations or labeling lanes. Honeywell Voice also tells workers when to apply UPC stickers. When needed, the picker prints labels with a Honeywell RP2 mobile printer and applies them to the order.

BENEFITS

Voice-Directed Systems Lower Costs and Improve Performance

Investment in advanced voice-directed technologies enabled Coastal Pet Products to immediately realize process improvements and other benefits, including:

• Improved productivity. The A720x mobile device sends order information faster than the older equipment they replaced, and operators pick up instructions quicker because the audio quality is better. As a result, Coastal Pet Products improved productivity by as much as 5 percent since implementing the new voice-directed technologies. In addition, the company is testing UPC sticker printing with Honeywell RP2 devices. The mobile printers save time that workers previously spent walking to and from fixed printer stations. “We’ve freed four to six hours per worker per day by adding on-demand UPC printing,” said Scott Honaker, IT technician, Coastal Pet Products.
• Reduced labor costs. In 2018, the company ran extra shifts on Saturdays to process orders or replenish inventory. In 2019, after updating the voice systems, only one Saturday for overtime work was needed. Overall, the company now operates with fewer workers as a result of improved productivity.
• Lowered training requirements. Time needed for training new and temporary employees has been reduced by at least 250 hours. Employees spent one to two hours to record templates so that the previous equipment could recognize and respond to their voices. “There’s no longer training to create a voice template. Instead, Honeywell Voice can quickly learn an employee’s voice while the worker learns what the directions from the device mean. We can have new workers productive in the first hour on day one,” Honaker said.
• Increased picking speed. With the updated voice technologies, workers pick orders faster and the company eliminated delays in packing and shipping which were caused by the slower communication capacity of the previous voice devices. “We’re never waiting for pickers anymore,” Honaker said. “Picks are completed in record time and we’re overloading the conveyor system now. We’re actually picking too fast.”
• Enhanced visibility. Honeywell Voice communicates in real time with a third-party WMS and also updates its inventory information in real time. Coastal Pet Products can better manage its business by having live, more accurate details about orders, what’s in stock, what’s being picked and replenished, and where fulfillment delays are occurring.

“We’re never waiting for pickers anymore. The system is speedier, and in our noisy environment, our operators can hear the directions clearly. They’re picking in record times now.”
— Scott Honaker

THE MOST IMPORTANT VOICE IS YOURS.

Getting the most out of your business begins with a dialogue. It’s our business to understand yours. And when you’re ready to talk, we’re ready to listen. Visit honeywellaidc.com/voice.
About Honeywell Intelligrated

Honeywell Intelligrated is a leading North American-based, single-source provider of automated material handling solutions and intelligent software that drive fulfillment productivity for retailers, manufacturers and logistics providers around the world. Through a broad portfolio of automation equipment, warehouse execution system software, services and support, our solutions give businesses a competitive edge in increasingly complex commerce and fulfillment environments.

The Connected Distribution Center

The pace of change in modern commerce is putting tremendous pressure on fulfillment operations. To stay competitive and protect profits, companies need solutions that help them achieve maximum throughput, day-to-day flexibility, future-proof scalability and intelligence to make informed decisions.

The Connected Distribution Center helps companies make the digital transformation necessary to increase reliability, improve utilization and maximize productivity through:

- Intelligent, data-driven, high-speed execution
- Automated, adaptable processes for machines and workers
- Optimized utilization with the ability to seamlessly adapt and expand
- Insights and predictive analytics, from sensors to the cloud