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Whitepaper: Reshaping Warehousing & Logistics Workflows





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Introduction

Global Person-to-Goods Solutions Provider

ForwardX Robotics is a global technology leader in the fields of Al and Robotics. Through its flexible automation platform comprising of intelligent mobile robots and Al-enabled software, ForwardX delivers material handling solutions for warehousing and manufacturing facilities that offer better performance at better value. The company offers a range of autonomous mobile robots (AMRs) that cater picking, moving, and sorting workflows. ForwardX provides the only solution for large, heavy case and pallet picking workflows, bringing the scalability, flexibility, and productivity that come with the swarming method that is already popular among businesses needing to meet growing customer demand or fluctuating seasonal trends.



Nicolas Chee Founder & CEO at ForwardX Robotics





Today's Workforce in the Warehouse

Warehouses must be more productive today than ever.

The sentence above is true now, was true five years ago, and will most likely still be true ten years from now. This is largely due to increases in eCommerce and omnichannel workflows that aren't showing any sign of slowing.

Worldwide eCommerce sales are on a trajectory to increase by almost 500% in just ten years since 2014 (see fig. 2). For consumers, eCommerce can be much more convenient than traditional means of shopping, but for businesses it can make operations a bit more complicated.

Labor Challenges

Employee Retention



MHI respondents who found hiring and retaining qualified workers challenging in 2021

Labor Pool Growth



Projected annual growth of the labor pool from 2024 to 2031, according to the Congressional Budget Office and Axios

Required Labor Pool Growth



Annual growth of warehousing labor required from 2014–2021, according to the US Bureau of Labor Statistics

Demand Challenges



MHI respondents who found customer demands for lower delivery costs challenging in 2021

Temp Employees in the Warehouse



Instawork respondents looking for temp employees within the next 12 months who will need temporary warehouse workers

ECommerce Growth 500%

Projected 10-year global eCommerce growth since 2014

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Traditionally, to improve overall productivity, a warehouse hires more people. In today's climate, hiring more people may not be a viable option. In the US alone, the warehousing industry is growing at a rapid pace. With such growth, more jobs are needed. However, we aren't seeing these jobs getting filled. In fact, there has been a significant labor shortage for some time now and as the industry has grown, the percentage of unfilled positions has only increased with future projections to see an even wider gap. Even the largest companies with vast resources are struggling and resorting to huge benefit packages in an attempt to attract more employees.

One such example which provides a clear view of the changing landscape for pay and benefits can be seen in Amazon's September 21st announcement (2021) where it stated it will begin to fully fund college tuition for more than 750,000 operations workers as part of its Career Choice program. All-in-all, the eCommerce behemoth plans to invest more than \$1.2B to expand its education and skills training programs to its employees in the U.S. Taking this into account, how can other organizations keep up?



ForwardX Max 600 AMR reshaping case-picking workflows in JD.com's warehouse



In the fall of 2021, Target was looking to hire 100,000 seasonal workers, while Walmart and Amazon were seeking 150,000 each.



When seasonal peaks arrive, it gets even harder. In the fall of 2021, Target was looking to hire 100,000 seasonal workers, while Walmart and Amazon were seeking 150,000 each. Then again in 2022, Target announced plans to hire 100,000 workers in stores and warehouses and Amazon aimed for 150,000 to "pick, pack, store and ship items in its warehouses."

It is clear productivity needs to improve if consumer demand is to be met. If the answer isn't more people, then we need to give our existing workforce the tools they need to improve at an affordable cost to businesses.

Today's Logistics Obstacles	Consequences	
Labor Shortage	With a labor pool that isn't keeping up with businesses' labor requirements, order fulfillment becomes more strenuous to individuals creating a cycle of low retention and high recruitment costs	
ECommerce Boom	A shift from brick and mortar to eCommerce has forced businesses to provide direct to consumer shipping causing major changes in workflows	
Consumer Demands	Consumers have come to expect next-day (in some cases same-day) delivery, putting a strain on businesses looking to stay competitive	
Manual Operations	Manual entry for order information leads high error rates when dealing with a growing number of SKUs; Manual picking is too slow to keep up with ever-increasing consumer demand & expectations	
Inventory Inaccuracies	Inventory inaccuracies lead to lost revenue, slow fulfillment, and customer dissatisfaction	
System Integration	Adding new systems that can't integrate with existing systems can lead to miscommunication and higher error rates	



The ForwardX Solution in Action



Autonomous Mobile Robots (AMRs) are built to optimize picking processes and reduce wasted time and movement for employees. AMRs take care of material movement, so employees don't have to, and they help guide workflows to eliminate errors.

Without AMRs, most of a piece picker's time is spent locating and transporting goods. When employees work alongside AMRs, the workers can focus on a specific zone within the warehouse. They no longer need to travel from one end to another for two items of an order.

Instead, the employee might be responsible for one aisle, or zone, where an AMR meets them. The worker then only needs to take a few seconds to grab the item for the order, place it on the AMR, and let the robot travel to the next picking zone where another employee will meet it. The first employee then moves on to a different order with another AMR on its way to the worker to fill another order.









ITOCHU Employees use RFID scanners and touch-screen interface to optimize workflows

The time benefits are immediate. Each picker can now get through far more picks per hour because they virtually eliminate the need to walk long distances empty handed or hauling goods.

AMRs also aid in guiding workflows to maximize productivity. When a picker is paired with an AMR, on-screen instructions make it easy for an employee to pick the right item the first time, every time. Employees no longer need to worry about knowing the best route to the next item or doing cross checks on a printout to see if the barcodes match up. Instead, they are focused on one zone and can quickly scan items as they place them on the AMR.

With AMRs guiding employees through each order, and with employees now only needing to focus on a specific zone, training times can be drastically reduced. Not only does the company need to hire less during peak seasons, now the company doesn't need to waste resources and man-power training all the part-time hires.

After an AMR has traveled to each destination around the warehouse and has collected all the items of an order, it automatically heads to the correct location to be unloaded. Once more, with the on-screen instructions, the person unloading the shipment can easily sort and pack the order without needing to double check everything, as it has already been scanned into the system.

With errors down, less returns are coming in, but even for the ones that do, AMRs are ready to take everything back where they belong using their constantly updated and shared map.





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Who is JD.com?

JD.com is China's largest online retailer and its biggest overall retailer, as well as the country's biggest Internet company by revenue. JD.com sets the standard for online shopping through its commitment to quality, authenticity, and its vast product offering covering everything from fresh food and apparel to electronics and cosmetics. Its unrivaled nationwide fulfillment network covers 99% of China's population, and provides standard same- and next-day delivery - a level of service and speed that is unmatched globally.

The company provides 580.8 million active customers with direct access to an unrivaled range of authentic, high-quality products, and helps leading local and international brands tap into China's fast-growing eCommerce market.



Why did JD.com need to automate?

JD.com brought in almost 150 billion dollars in revenue in 2021 alone. Covering a population of over 1 billion with products across every major category (electronics, apparel, home furnishings, FMCG, grocery, home appliances, etc.) requires serious planning and man-power. To continue growing in the face of COVID-19, eCommerce trends, and labor shortages, JD.com had to look to an automation solution that was cost efficient, reliable, productive, flexible, and scalable.

The first project JD.com and ForwardX collaborated on was a ForwardX Max solution. The solution was built for case picking workflows in both B2B retail store replenishment and B2C eCommerce fulfillment. The high-tensity nature of case picking led to high turnover that JD.com needed to address.

The flagship project needed to cover a large volume of orders while staying flexible for peak and slow seasons. The competitive market for labor meant that JD.com needed to increase productivity using its existing workforce and decrease turnover.







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Pilot Project With JD

Pain Points

- High labor dependency
- Physically demanding workflows
- High labor turnover
- High operational costs
- Low productivity

Using pallet trucks to pick thousands of cases per day, JD.com needed a solution that could relieve employees of the grueling tasks and reduce its labor dependency in its facility. Furthermore, JD.com needed a solution that could double its productivity in order to keep up with growing volume.



ForwardX Max AMR travels autonomously across the warehouse after completing its picking task

Solution

JD.com and ForwardX worked together to come up with a ForwardX Max solution to address the warehouse's pain points. The solution consisted of 12 Max 600 AMRs and f(x) Fleet Manager that connected to JD.com's existing WCS (warehouse control system).

Using ForwardX's unique picking algorithms, JD.com was able to meet its growing throughput requirements in the face of growing labor costs and a dwindling workforce.

The Max 600 AMRs are also configured to handheld devices that pickers use to scan and check the goods as they are picked. After confirming a correct pick, the picker then prints a shipping label and sticks it to the case. The simplified process and real-time checking also led to an increase in accuracy for the warehouse.





Results



ForwardX Max AMR meets a worker at the unloading station

The average units picked per hour (UPH) over the course of 7 consecutive days increased by 136% (2.36x) from its previous manual picking process. This was 65% higher than the project acceptance target.

With the added accuracy and productivity, the warehouse saved 30% on operational costs and was able to fulfill thousands of daily orders for both its B2B store replenishment and B2C eCommerce fulfillment.

The immediate results led to a new project that was deployed in the same month at another warehouse with similar workflows using 10 Max 600 AMRs. Since the flagship project, over 30 projects have been deployed serving a wider range of workflows for the company.

JD.com & ForwardX Scale up

	Warehouse Location & Size	Workflow	Robots
December 2020	Foshan - 54,000 sq ft Guangzhou - 54,000 sq ft	Beverage Distribution	12 Max 600 AMRs 10 Max 600 AMRs
April 2021	Chengdu - 70,000 sq ft	Milk Distribution	9 Max 600 AMRs
August 2021	Haikou - 43,000 sq ft Nanning - 54,000 sq ft Xiamen - 97,000 sq ft	Beverage & Small Appliance Distribution	9 Max 600 AMRs 9 Max 600 AMRs 12 Max 600 AMRs
September 2021	Hangzhou - 43,000 sq ft	Water Distribution	8 Max 600 AMRs
October 2021	Guangzhou - 43,000 sq ft	Beverage Distribution	12 Max 600 AMRs
March 2022	Chongqing - 54,000 sq ft	Beverage & Small Appliance Distribution	11 Max 600 AMRs
May 2022	Chengdu - 32,000 sq ft Tianjin - 54,000 sq ft	Beverage & Small Appliance Distribution	6 Max 600 AMRs 11 Max 600 AMRs
August 2022	Foshan - 105,000 sq ft Foshan - 108,000 sq ft	Supermarket Distribution Toiletry Distribution	36 Flex 300 AMRs 36 Flex 300-L AMRs





618 Shopping Holiday

JD.com successfully launched its 618 online shopping holiday in 2010 and the event has grown exponentially over the past decade. Today the holiday has all major Chinese eCommerce companies offering mid-year deals to consumers, but JD.com remains the #1 platform during the period.

In the U.S., Black Friday and Cyber Monday are consistently the top two in terms of spending, but the 618 shopping holiday blows the combined total out of the water. The JD platform alone generated \$56.48 billion in online sales during 618 in 2022, while the combined online sales of Black Friday and Cyber Monday saw \$19.6 billion in the whole of the U.S. in 2021.

JD.com entrusted ForwardX Max AMRs in many of its warehouses during its 618 holiday to help meet the influx of orders. Due to the flexible and scalable nature of the solution, companies can quickly deploy more AMRs for peak seasons to supplement the workforce and meet sudden rise in demand.





ForwardX Max AMRs working overtime to meet the rise in demand during JD.com's 618 shopping holiday.



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Forward X Robotics

Conclusion

It's evident that productivity levels need to increase if consumer demands are going to be met. Consumers today are spending more time shopping online where they expect fast and accurate deliveries, easy return processes, and high-quality customer service. This, added to store replenishment, creates more complex workflows for warehouses and distribution centers.

Hiring more people to get the job done doesn't work when there aren't enough people to fill the jobs. The current model isn't attractive for employees, it's expensive, and it's slow. The way forward is with AMRs. Through optimized workflows and simpler processes, we can triple the output of our workforce while creating a healthier work environment. Employees deserve to be comfortable, consumers deserve to get what's promised, and businesses deserve to maximize profit.

Take the first step today in making your operations faster, stronger, and smarter. See how ForwardX AMRs can help your operations.

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Forward X Robotics

The company is comprised of over 250 members hailing from top universities and leading enterprises around the world. As shown by the 200+ patents pending and its award-winning research work, such as 2 1st-Place Prizes at TRECVID, the 1st-Place Prize at IEEE's VOT-RT, RBR50's 2022 Innovation Award, and Frost & Sullivan's Technology Innovation Leadership Award, ForwardX's team boasts some of the world's top computer vision scientists and robotics experts.

With offices in China, Japan, and the US, along with partnerships around the globe, ForwardX is expanding and applying its proven solutions to warehouses and manufacturers worldwide.

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