

# EBOOK

BENEFITS OF OPEX® SURE SORT® X AUTOMATED SORTING SYSTEM OVER AUTONOMOUS MOBILE ROBOTS (AMRS)

A comprehensive analysis of efficiency and cost-effectiveness.



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## **60-SECOND SUMMARY**

Sorting solutions can make or break warehouse efficiency. This eBook breaks down how OPEX<sup>®</sup> Sure Sort<sup>®</sup> X with Xtract stacks up against autonomous mobile robots (AMRs) across key areas like throughput, space use, and overall costs. Sure Sort X stands out with higher efficiency, smaller space requirements, and less manual work, while AMRs offer more flexibility but may have diminished returns. Through practical use cases—like returns processing, order sorting, and store replenishment—you'll get a clear picture of which solution fits your needs.

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# INTRODUCTION

The rise of automation in the warehouse and logistics industry has led to significant advancements in sorting systems, with Autonomous Mobile Robots (AMRs) and solutions like the OPEX Sure Sort X leading the charge. Both systems offer unique benefits, but how do they stack up against each other in real-world applications?

This eBook provides an in-depth comparison between AMRs and the OPEX Sure Sort X Automated Sorting System. We'll explore their features, performance in key use cases, and evaluate factors such as cost, scalability, and operational efficiency to help businesses make an informed decision based on their specific needs.

## CHAPTER 1

## OVERVIEW OF AUTOMATED SORTING SYSTEMS

## AUTONOMOUS MOBILE ROBOTS (AMRs)

AMRs are designed to navigate and perform tasks independently. Their flexibility and adaptability make them suitable for sorting operations, especially in dynamic environments where changes in layout or processes are frequent. AMRs can autonomously transport items to designated locations, optimizing workflow efficiency. However, they often require multiple units to maintain throughput and face limitations regarding handling varied item types.

## **Key Advantages:**

- Flexibility: AMRs can adapt to changes in warehouse layouts and processes.
- **Scalability:** Adding more robots allows companies to scale operations according to demand.
- Independent Navigation: Robots use sensors like LIDAR, GPS, cameras, and machine learning to move goods and optimize routes.

## **Potential Drawbacks:**

- **Throughput:** The speed and efficiency of AMRs often depend on the number of robots deployed, which can lead to diminished returns as fleets grow larger.
- **Charging and Maintenance:** AMRs require regular charging and maintenance, which can lead to operational downtime and additional maintenance costs.
- Handling Capabilities: AMRs may struggle to handle a wide range of item types and weights, especially smaller or uniquely shaped products.



Autonomous Mobile Robots (AMRs) For Sortation



## **OPEX® SURE SORT® X**

The Sure Sort X is an advanced automated sorting system that leverages OPEX's proprietary technology to offer high throughput and efficiency. Engineered to handle a wide range of sorting tasks with minimal manual intervention, Sure Sort X is ideal for various industries, including third-party logistics (3PL), distribution, and retail. Its sophisticated design allows for advanced automation features that enhance operational efficiency and accuracy.

OPEX Xtract is an optional feature for Sure Sort X that automates the order takeaway and packout process. The Xtract iBOTs retrieve totes containing sorted orders and dispense them into the proper container, including shipping boxes, for downstream processing.

## Key Advantages of Sure Sort X:

- High Throughput: Capable of processing up to 2,100 items per hour.
- Energy Efficiency: iBOTs within the system self-charge and capture energy when breaking.
- Space Efficiency: Requires significantly less space than AMRs while maintaining a similar or higher throughput.
- WMS Integration: The system integrates seamlessly with warehouse management systems (WMS) to streamline operations.

## **Potential Drawbacks:**

- Initial Investment: The upfront cost of Sure Sort X can be higher than that of deploying an AMR fleet, especially for smaller operations.
- Less Flexibility: The system's fixed, stationary design makes it less adaptable to changes in warehouse layout compared to free-roaming AMRs.



OPEX Sure Sort X (Front View)



**OPEX Sure Sort X (Side View)** 

## FEATURE COMPARISON

Feature	OPEX Sure Sort X	AMRs
Sorting Capacity	Up to 2,100 items per hour	Varies depending on the model; typically handles lower throughput per robot but can scale with the addition of more units.
Payload Capacity	20 lbs. (9.1 kg) per iBOT	Varies across manufacturers, often handling up to 50 lbs. (22.7 kg)
Scalability	Highly scalable with modular bin configurations and additional iBOTs	Easily scalable by adding more robots to meet fluctuating demand
Induction & Sorting Method	Conveyor-based induction with six-sided scanning and automatic sortation	Item retrieval and transport through flexible routes, typically relying on vision or barcode scanning
Energy Efficiency	Self-charging iBOTs; energy is captured during braking	AMRs are typically battery-powered and must be docked for charging between tasks.
WMS Integration	Seamlessly integrates with WMS/WCS	Easily integrates with most WMS solutions.
Operation Mode	Stationary system with iBOTs moving inside the sortation area	Free-roaming mobile robots navigating the warehouse autonomously.





# CHAPTER 2 USE CASES

To better understand the real-world applications of these two technologies, let's explore their performance across three common warehouse tasks: returns processing, finished order sorting, and store replenishment.



**Returns Processing** 

## **USE CASE #1: RETURNS PROCESSING**

In returns processing, speed and accuracy are critical. Below is a comparison of how AMRs and Sure Sort X perform in this setting:

## **Key Insights:**

The OPEX Sure Sort X delivers the same throughput as AMRs but requires fewer robots, occupies less space, and reduces the need for additional operators due to its automated pack-out feature. This results in more efficient returns processing and lower operational costs.

	AMR	Sure Sort X
Throughput (Items/hour)	1,800	1,800
Sort Locations	96	99
Number of Robots	20	10
Space Occupied (Sq. Ft.)	1,500	530
Induction Operators	2	1
Automated Packout	No (2 additional FTEs required)	Yes



(2024 MHI Annual Industry Report)



## **USE CASE #2: FINISHED ORDER SORTING**

When sorting finished orders, speed and accuracy are again paramount. Here's how each system compares:

## **Key Insights:**

For finished order sorting, AMRs and Sure Sort X can both handle large order volumes. However, Sure Sort X demonstrates greater flexibility, particularly in managing space constraints and operator needs.

	AMR	Sure Sort X
Throughput (Items/hour)	2,000	1,800
Sort Locations	180	201
Number of Robots	23	15
Space Occupied (Sq. Ft.)	2,073	960
Induction Operators	2	1
Automated Packout	No (2 additional FTEs required)	Yes



Store Replenishment

## **USE CASE #3: STORE REPLENISHMENT**

In-store replenishment often involves handling large volumes and diverse types of inventory. Here's a breakdown of the systems:

## **Key Insights:**

Both systems provide similar throughput capabilities for in-store replenishment, but Sure Sort X excels in efficiency, offering advanced automation features and better use of available space. The breakdown above demonstrates how Sure Sort X delivers enhanced performance with fewer robots and lower space requirements, helping organizations maximize productivity.

	AMR	Sure Sort X
Throughput (Items/hour)	1,050	1,050
Sort Locations	450	465
Number of Robots	13	11
Space Occupied (Sq. Ft.)	2,720	1,235
Induction Operators	2	1
Automated Packout	No (2 additional FTEs required)	Yes

Input 59	Sorted 55 Outso	rts 0	Rejects	4		
Feed Ra	te (60 second burst). 0 Pe	eak 1440				
Record#	ProductID	Devid				
7455	02812421TRI+R42802460000+	Reader	Length	Widb		
7456	050428341662	Auto	5 505000	1.910000	0.578000	
7457	730922249045000000000000000000000000000000	Auto	3.940000	2.982000		
745.9	P3C0022240345[N0686142202307	Auto	6.001000	1.927000	115200	
	035003001255	Auto	3.459000	1.014000		

# CHAPTER 3 PERFORMANCE METRICS: AMRs VS. SURE SORT X

Performance metrics are a critical factor when choosing an automated sorting system. This section will explore various performance dimensions that highlight how Autonomous Mobile Robots (AMRs) and OPEX Sure Sort X perform in key operational areas.



## THROUGHPUT AND PRODUCTIVITY

Throughput refers to the number of items that a sorting system can process within a specific period, typically measured in items per hour. Throughput is a crucial metric for businesses that rely on high-speed order fulfillment and efficient material handling.

#### **Autonomous Mobile Robots:**

The throughput of an AMR-based system varies depending on the number of robots deployed and the complexity of the assigned tasks. A single AMR typically handles lower throughput than stationary systems like Sure Sort X. However, throughput can be increased by adding more robots to the fleet.

The downside is that adding too many AMRs may result in congestion and reduced efficiency, especially in tight or crowded spaces. Generally, AMRs can process between 100 to 200 items per robot per hour, depending on the model and the warehouse configuration.

## **OPEX Sure Sort X:**

Sure Sort X has a distinct advantage in raw throughput, capable of handling up to 2,100 items per hour. This high throughput is made possible by its iBOT technology, which ensures continuous, uninterrupted sorting. Each iBOT can sort items precisely, and the system can scale by adding more iBOTs or expanding modules to accommodate growing demand without sacrificing speed. Sure Sort X's structured, conveyor-based design ensures consistent and reliable throughput, even during peak periods.

## Key Takeaway:

Sure Sort X offers superior throughput, especially for businesses requiring consistent, high-speed sorting. AMRs can also provide high throughput but may require a large fleet to achieve similar results, which can increase costs and lead to logistical challenges.



49% of operations professionals are using conveyor and sortation systems, with 52% of those users planning to implement or upgrade this equipment over the next 24 months.

(Modern Materials Handling "2024 Automation Solutions Study")



## OPERATOR REQUIREMENTS AND LABOR EFFICIENCY

Operator efficiency measures the human labor required to run and maintain a sorting system. Automation aims to reduce manual labor, improving overall productivity and labor costs.

#### **Autonomous Mobile Robots:**

AMR systems typically require more operator involvement than Sure Sort X. Depending on the complexity of the tasks, operators are often needed to assist in item induction, manage robot traffic, or handle packout and other end-stage processes. For example, AMR systems used for sorting may still require manual packout stations, where human workers are responsible for boxing or packing sorted items for shipping. This can reduce the overall automation benefits, especially in high-volume operations.

Additionally, because AMRs require periodic charging and maintenance, operators or technicians may be needed to ensure the smooth functioning of the robot fleet. On average, businesses deploying AMR systems may need two to three operators for every 20-25 robots.

#### **OPEX Sure Sort X:**

The Sure Sort X system is designed to be highly automated, reducing the need for manual intervention. Items are inducted into the system and sorted automatically, with minimal human interaction required.

Sure Sort X integrates features like automated packout, eliminating the need for additional labor to box or pack sorted items. As a result, Sure Sort X typically requires fewer operators than AMR systems. On average, the system can be managed with 1-2 operators, even in high-volume environments, significantly reducing labor costs and human error.

#### Key Takeaway:

Sure Sort X offers greater labor efficiency, requiring fewer operators due to its high level of automation. AMRs, while reducing manual handling to some extent, often require more operators for tasks like packout and maintenance.

52% of supply chain leaders report supply chain talent shortages and hiring and retaining qualified workers as a significant or extreme challenge.

(2024 MHI Annual Industry Report)





## SPACE UTILIZATION

Space utilization refers to the amount of floor space the sorting system requires to achieve its full potential. This metric is crucial for businesses operating in warehouses with limited space or high real estate costs.

#### Autonomous Mobile Robots:

AMR systems are often applauded for their flexibility but typically require more physical space than stationary systems. Each AMR needs space to navigate autonomously, avoid obstacles, and complete tasks like transporting goods or sorting items. While AMRs do not require large, fixed infrastructure like conveyors or sortation bins, they may need wide, clear aisles to move efficiently. As a result, the overall space occupied by an AMR-based system can be substantial, particularly as more robots are added to scale throughput. In some cases, **AMRs may require up to 2,500 square feet** for moderate-to-high-volume sorting operations.

### **OPEX Sure Sort X:**

Sure Sort X is highly space-efficient, with a compact design consolidating its sorting functions within a smaller footprint. Its stationary, conveyor-based architecture eliminates the need for wide aisles or extensive floor space for mobile operations. Sure Sort X typically requires around 1,000 to 1,500 square feet to achieve high throughput, significantly less than most AMR-based systems with comparable processing power. Additionally, the modular nature of the system allows businesses to expand sorting capacity vertically rather than horizontally, further optimizing space usage.

### Key Takeaway:

Sure Sort X is generally more space-efficient than AMRs, making it an excellent choice for businesses that need to maximize their floor space. AMRs, while flexible, require more room to navigate and may occupy a larger area as more robots are added to the system.



## FLEXIBILITY AND ADAPTABILITY

Flexibility is a critical factor for businesses that operate in dynamic environments or experience frequent changes in layout or processes.

#### Autonomous Mobile Robots:

One of the key strengths of AMRs is their adaptability to changing environments. Because AMRs are mobile and not tied to fixed infrastructure, they can easily adjust to different warehouse layouts, new workflows, and fluctuating demand. If a business expands or changes operations, AMRs can be reprogrammed to adapt to the new environment. This makes AMRs particularly suitable for companies that require frequent reconfiguration of their operations, such as e-commerce fulfillment centers or warehouses with seasonal demand spikes.

#### **OPEX Sure Sort X:**

Sure Sort X offers modular scalability, allowing businesses to expand their sorting capacity by adding more iBOTs or modules. However, its stationary design best suits operations with consistent workflows and fixed layouts. While Sure Sort X is highly efficient within a stable environment, it lacks the flexibility of AMRs when it comes to adapting to significant changes in warehouse configuration or process flow.

#### Key Takeaway:

AMRs are flexible, making them better for dynamic environments where layouts and processes frequently change. Sure Sort X, though less flexible, offers scalability and high efficiency in operations with consistent workflows.



## ENERGY EFFICIENCY AND SYSTEM AVAILABILITY

Energy consumption and system availability are important factors in the total cost of ownership and operational uptime.

#### **Autonomous Mobile Robots:**

AMRs are typically battery-powered and need to be recharged periodically. The charging time can impact system availability, as robots must be offline during recharging. On average, AMRs charge about **10 minutes for every 1.5 hours of operation**.

To maintain continuous operation, businesses often need to deploy extra robots or implement a rotation system to ensure productivity does not suffer during recharging. Additionally, frequent charging and discharging of batteries can lead to longterm wear and reduced battery life, increasing operational costs.

#### **OPEX Sure Sort X:**

Sure Sort X uses iBOTs, which are **energy-efficient and self-charging**. Energy is captured during braking, reducing overall energy consumption. The iBOTs in Sure Sort X are designed to operate continuously without frequent charging interruptions, enhancing system availability. This feature minimizes downtime and ensures the system maintains high throughput without additional backup units.

#### Key Takeaway:

Due to its self-charging iBOTs, Sure Sort X is generally more energy-efficient and offers higher system availability. While effective, AMRs require careful charging cycle management, which can reduce availability and increase energy consumption over time.



## ACCURACY AND ERROR RATES

Accuracy in sorting is crucial for minimizing errors, returns, and customer dissatisfaction. A system's ability to handle different types of items and ensure precise sorting can significantly affect the operation's overall efficiency.

#### **Autonomous Mobile Robots:**

The accuracy of AMRs typically depends on the sensors, cameras, or barcode scanners used to guide them. While AMRs can achieve high accuracy levels in structured environments, they may face challenges with irregularly shaped, small, or poorly labeled items. In some cases, AMRs may misread or misroute items, leading to errors in the sorting process. To minimize these issues, businesses must ensure that items are correctly positioned and labeled.

#### **OPEX Sure Sort X:**

Sure Sort X uses six-sided barcode scanning technology, which scans multiple sides of an item to ensure that all barcodes are correctly read, regardless of the item's orientation. This multi-angle scanning reduces the risk of mis-sorts and improves overall accuracy. Additionally, the system is designed to handle a wide range of item types, including irregularly shaped or small items that might be challenging for AMRs. This makes Sure Sort X a reliable choice for businesses with diverse product lines or complex sorting requirements.

#### Key Takeaway:

Sure Sort X offers superior accuracy with its six-sided scanning technology, reducing the likelihood of errors. AMRs can also provide accurate sorting but may struggle with certain item types or labeling issues, potentially leading to higher error rates.



# CHAPTER 4 COST CONSIDERATIONS

## **INITIAL INVESTMENT**

AMRs may appear more cost-effective initially due to the relatively lower upfront investment. However, businesses should also consider the cost of floor preparation, mapping, and integration into existing systems, which can increase deployment costs.

Sure Sort X, while typically having a higher upfront cost, includes a more comprehensive package of automation features that may reduce labor and maintenance costs over time, resulting in potential savings in the long run.

## **ONGOING MAINTENANCE & OPERATING COSTS**

AMRs generally require regular maintenance, mainly related to charging, battery replacement, and system updates. Sure Sort X's more stationary infrastructure results in less frequent maintenance needs, but any system downtime for repairs could affect throughput.

## SCALABILITY

Both systems offer scalability, though in different ways. AMRs are easily scalable by adding more robots, making them a good fit for growing operations with fluctuating demand. Sure Sort X, on the other hand, offers scalability through modular expansion but is better suited for businesses with predictable, steady growth patterns.



## HIDDEN COSTS OF AMRS

When deploying Autonomous Mobile Robots (AMRs), several hidden costs can significantly impact the total cost of ownership. Here are some of the most common hidden costs to consider:

#### **Setup and Initial Configuration**

- Environment Modification: Adapting the workspace to accommodate AMRs may require physical layout or infrastructure changes.
- Mapping & Path Creation: Creating maps, waypoints, and missions for AMRs can be time-consuming and may require specialized skills.
- Integration with Existing Systems: Costs associated with integrating AMRs with current warehouse management or operational system.

#### **Training and Labor**

- **Employee Training:** Significant time and resources may be needed to train staff on operating, maintaining, and working alongside AMRs.
- **Potential Hiring:** You might need specialized personnel, such as roboticists or technicians, to manage the AMR system.

#### **Ongoing Operational Costs**

- Energy Consumption: The power requirements for running AMRs continuously can add up over time.
- Software Updates: Regular software updates may be necessary to keep the system running optimally.
- Maintenance & Repairs: Routine maintenance and unexpected repairs can incur significant costs.

#### **Reconfiguration and Scalability**

- System Reconfiguration: Adapting AMRs to new workflows or layouts can involve additional costs.
- Scalability Expenses: As operations grow, investing in more robots or different models may be necessary, leading to increased costs.

#### **Downtime and Productivity Loss**

- **Operational Disruptions:** Any downtime for maintenance or repairs can result in productivity losses.
- Learning Curve Impact: Initial implementation may temporarily reduce efficiency as staff adapt to the new system.

#### Integration and Testing

- **Customization Costs:** Modifying existing software or hardware to meet specific customer requirements can be expensive.
- **Testing Expenses:** Thorough testing can involve significant time and resource costs.

#### **Customer Support and Communication**

- **Ongoing Support:** Providing continuous support to ensure successful integration and address issues quickly.
- Communication: Implementing and maintaining systems to keep customers informed about their AMR operations.



"Sure Sort X is an innovative application of industry-leading automated sortation technology, empowering us to dramatically improve operational efficiency, save time and money, and continually exceed customers' expectations."

- Bruce Ogilvie, Chairman of Alliance Entertainment

## CHAPTER 5

# SURE SORT X WITH OPEX XTRACT

The addition of **OPEX Xtract** to the **Sure Sort X** system significantly enhances its abilities compared to AMRs by fully automating the post-sorting process, from order retrieval to takeaway.

While AMRs excel in flexibility and adaptability, they often require additional manual intervention, particularly for tasks like packing or shipping preparation. In contrast, Xtract automates these labor-intensive steps, allowing Sure Sort X to handle both sorting and order fulfillment without manual packout, which AMRs typically can't fully automate.

Xtract also improves throughput and efficiency by seamlessly transferring sorted items to downstream processes like packaging or shipping, eliminating the need for extra robots or manual stations. This results in higher productivity with fewer operators and reduced floor space, whereas AMR systems often need additional robots, charging stations, and manual packout areas to achieve similar levels of performance.

The integration of Xtract allows Sure Sort X to provide a more streamlined, space-efficient, and labor-saving solution than AMRs can typically offer.



Sure Sort X with Xtract (Side View) 15 Module System with Five Xtract Modules



# CONCLUSION

The OPEX Sure Sort X automated sorting system significantly outperforms autonomous mobile robots in throughput, efficiency, space utilization, operator requirements, and total cost of ownership. Its advanced automation features, combined with a robust design capable of handling a wide variety of items, make it an ideal choice for industries looking to enhance their sorting operations.

While AMRs provide flexibility and adaptability, the Sure Sort X's comprehensive benefits and lower long-term costs are compelling for its adoption in modern sorting facilities.



## NEXT GENERATION AUTOMATION

We engineer unique automated solutions to address complex business challenges. Our scalable Warehouse and Document & Mail Automation solutions drive efficiencies in infrastructure. Our familyowned company has over 1,500 committed employees who work together to innovate, manufacture, install, and service products that are helping transform industries every day. We listen to our customers and work together to reimagine the future through automated solutions.



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