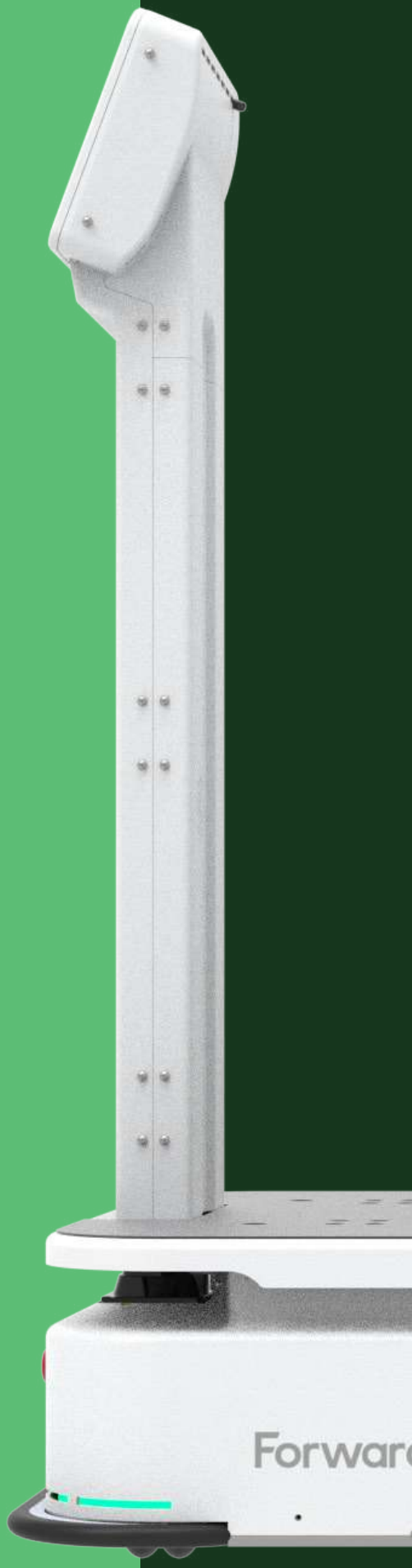
Forward Robotics

One Software for Every Move

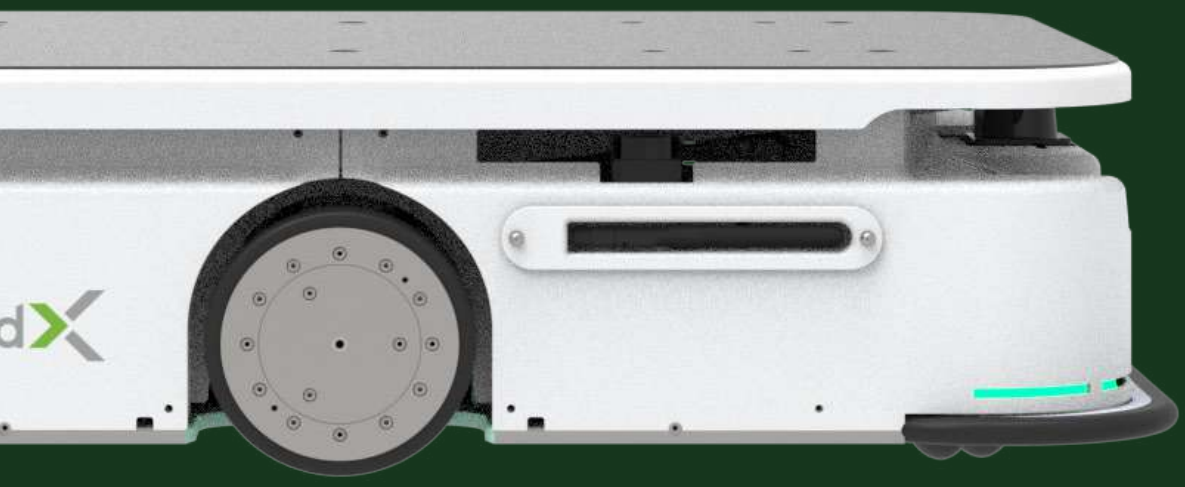
Omni Fleet: Your Complete Material Handling Suite

The future is faster.
The future is stronger.
The future is smarter.

Nicolas Chee
Founder and CEO
ForwardX Robotics



Contents



Fulfillment

Workflows

Piece Picking
Use Flex AMRs for batch picking or discrete order picking of small individual items.

Case Picking
Use Flex or Max AMRs for larger individual items or case loads of smaller items.

Pick and Pack
Use Flex or Max AMRs to pick and place items directly into packing containers and apply shipping labels on the fly.

Your Current Pain Points

Low Productivity
Rising ecommerce volume means more orders and pieces to pick. The traditional manual methods are slow, labor intensive, and restrictive.

High Labor Costs
Piece picking requires more space and more labor. Traditional operations spend more money to hire and retain workers, and this results in lower margins.

Low Efficiency
Wasted movement is wasted time and wasted money. Traditional operations are limited by low efficiency and need smart automation.

High Error Rate
Manual methods cause errors, and errors waste time and money. Errors also result in a poor customer experience, and error resolution is costly.

Industries

3PL

Omnichannel

Ecommerce

Results We Deliver

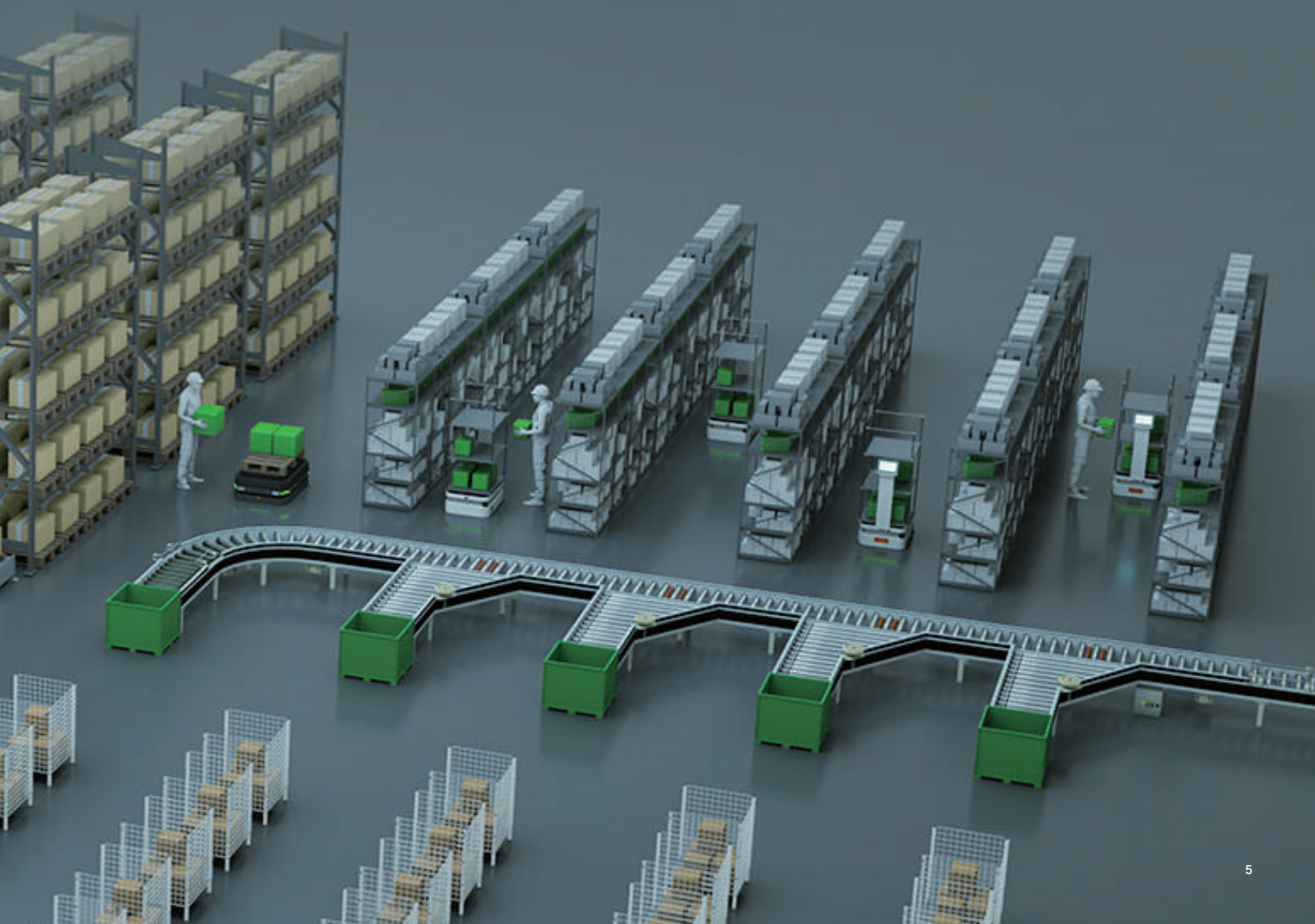
Productivity: 2x–3x UPH Increase
ForwardX solutions increase productivity through consolidated workflows that reduce wasted time and increase output. Double or even triple your pickers' units picked per hour by removing insignificant tasks.

Accuracy: Up to 99.9% Picking Accuracy
Instead of pick lists, f(x) organizes and distributes orders directly to employees. Use on-screen visual directions and onboard RFID scanning, so your workers can pick correctly the first time, every time.

Payback: ROI in Under 9 Months
ForwardX solutions deliver immediate results. See a marked improvement and financial gain in under 2 weeks, and get a guaranteed return on investment in less than 9 months.

Efficiency: 60% Reduction in Walking Time
AMRs handle material movements, allowing employees to focus on more important tasks. Reduce traveling, picking, and order reviewing time to achieve more in a shorter period.

Savings: 50% Reduction in Labor Costs
AMRs address recruitment and turnover issues by increasing productivity and worker satisfaction. Automate repetitive workflows and redistribute your work force to cut your fully burdened labor costs in half.



Distribution

Workflows

Piece Picking
Use Flex AMRs for batch picking or discrete order picking of small individual items.

Case Picking
Use Flex or Max AMRs for larger individual items or case loads of smaller items.

Pallet Picking
Use Max AMRs to pick direct to pallets.

Pick and Pack
Use Flex or Max AMRs to pick and place items directly into packing containers and apply shipping labels on the fly.

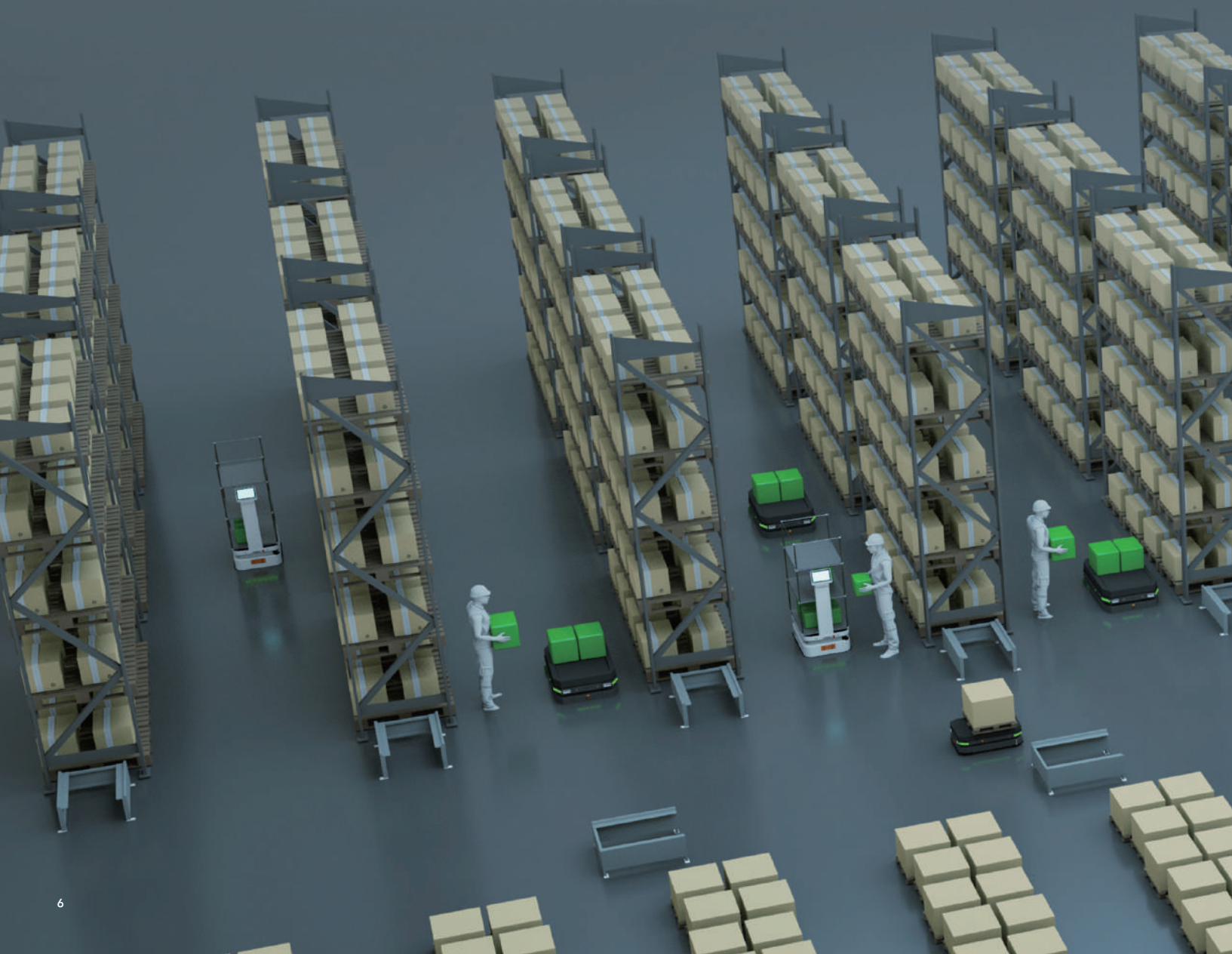
Your Current Pain Points

High Labor Intensity
Distribution environments can be harsh, and workflows can be physically draining. High labor intensity results in errors and worker turnover.

High Labor Costs
Labor intense work means high labor and recruitment costs. Traditional methods squeeze profit margins and are at the mercy of a growing labor shortage.

Low Efficiency
Traditional methods are time-consuming and inefficient. Changing logistics network design results in a need for faster and more efficient workflows.

Safety Concerns
Heavy goods in larger quantities means safety risks, and traditional forklift methods contribute to rising instances of accidents.



Industries

3PL

Wholesale

Omnichannel

Results We Deliver

Productivity: 2x–3x UPH Increase
ForwardX solutions increase productivity through consolidated workflows that reduce wasted time and increase output. Double or even triple your pickers' units picked per hour by removing insignificant tasks.

Accuracy: Up to 99.9% Picking Accuracy
Instead of pick lists, f(x) organizes and distributes orders directly to employees. Use on-screen visual directions and onboard RFID scanning, so your workers can pick correctly the first time, every time.

Payback: ROI in Under 9 Months
ForwardX solutions deliver immediate results. See a marked improvement and financial gain in under 2 weeks, and get a guaranteed return on investment in less than 9 months.

Efficiency: 60% Reduction in Walking Time
AMRs handle material movements, allowing employees to focus on more important tasks. Reduce traveling, picking, and order reviewing time to achieve more in a shorter period.

Savings: 50% Reduction in Labor Costs
AMRs address recruitment and turnover issues by increasing productivity and worker satisfaction. Automate repetitive workflows and redistribute your work force to cut your fully burdened labor costs in half.

Manufacturing

Workflows

Cart Transport
Use Flex L or Max L AMRs for point-to-point cart transportation, such as line delivery, WIP movement, and finished goods.

Pallet Transport
Use Max L AMRs for point-to-point pallet transportation, such as inbound receiving of raw materials, putaway, and production-to-warehouse movement.

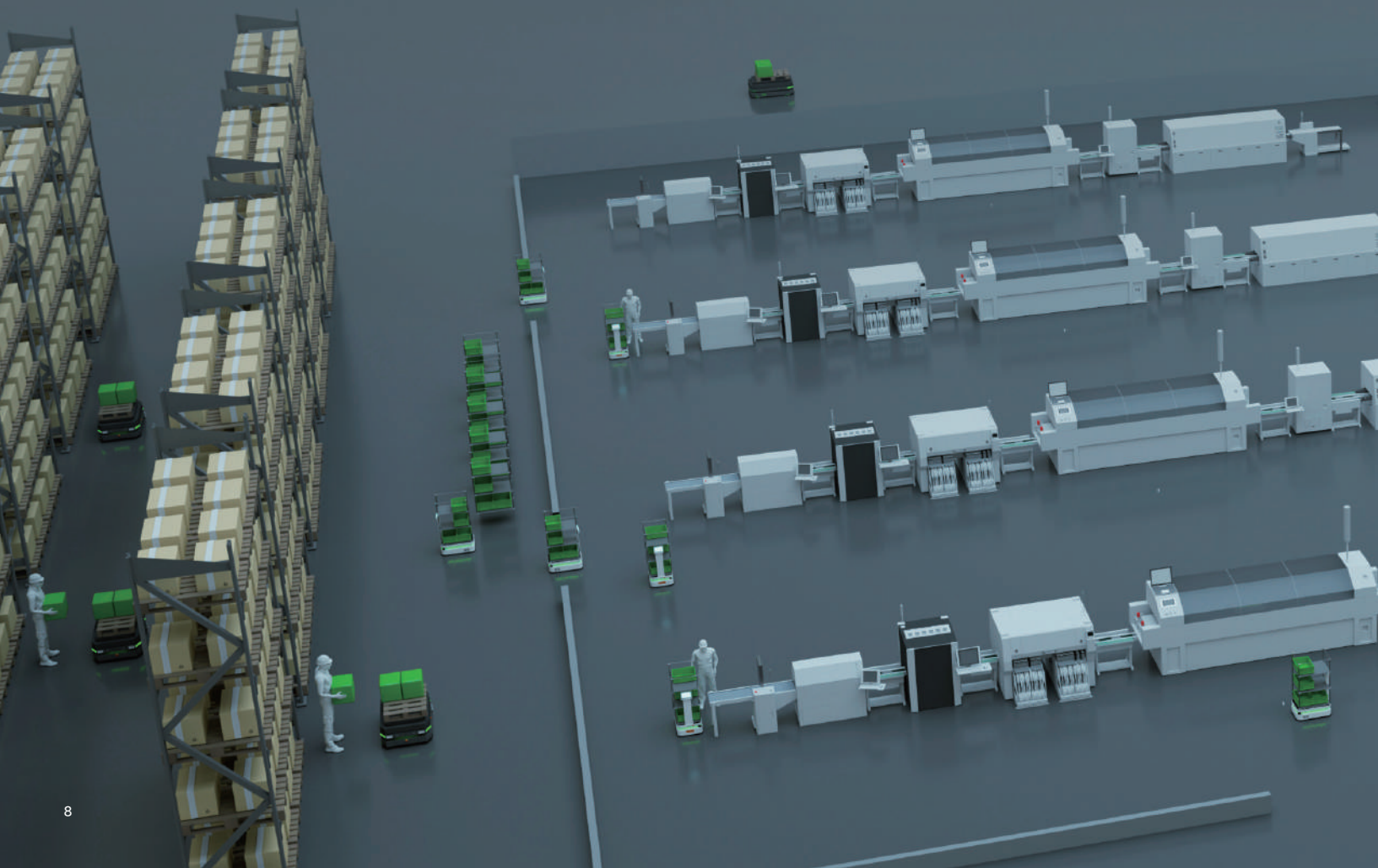
Your Current Pain Points

Low Flexibility
SKUs are increasing, and product life cycles are decreasing. This means production lines must change to keep up, but current operations are too rigid.

Low Predictability
Manual operation lacks predictability due to complicated processes between lines with different cycles. Therefore, large material buffers are required.

High Labor Costs
Labor intensity is high, turnover is fast, and recruitment and training costs are high. This causes huge labor cost pressures for manufacturers.

High Error Rate
Complex material requirements and frequent iterations make operations complicated and lead to frequent errors.



Industries

Electronics

Semiconductor

Automotive Parts

Home Appliance

Results We Deliver

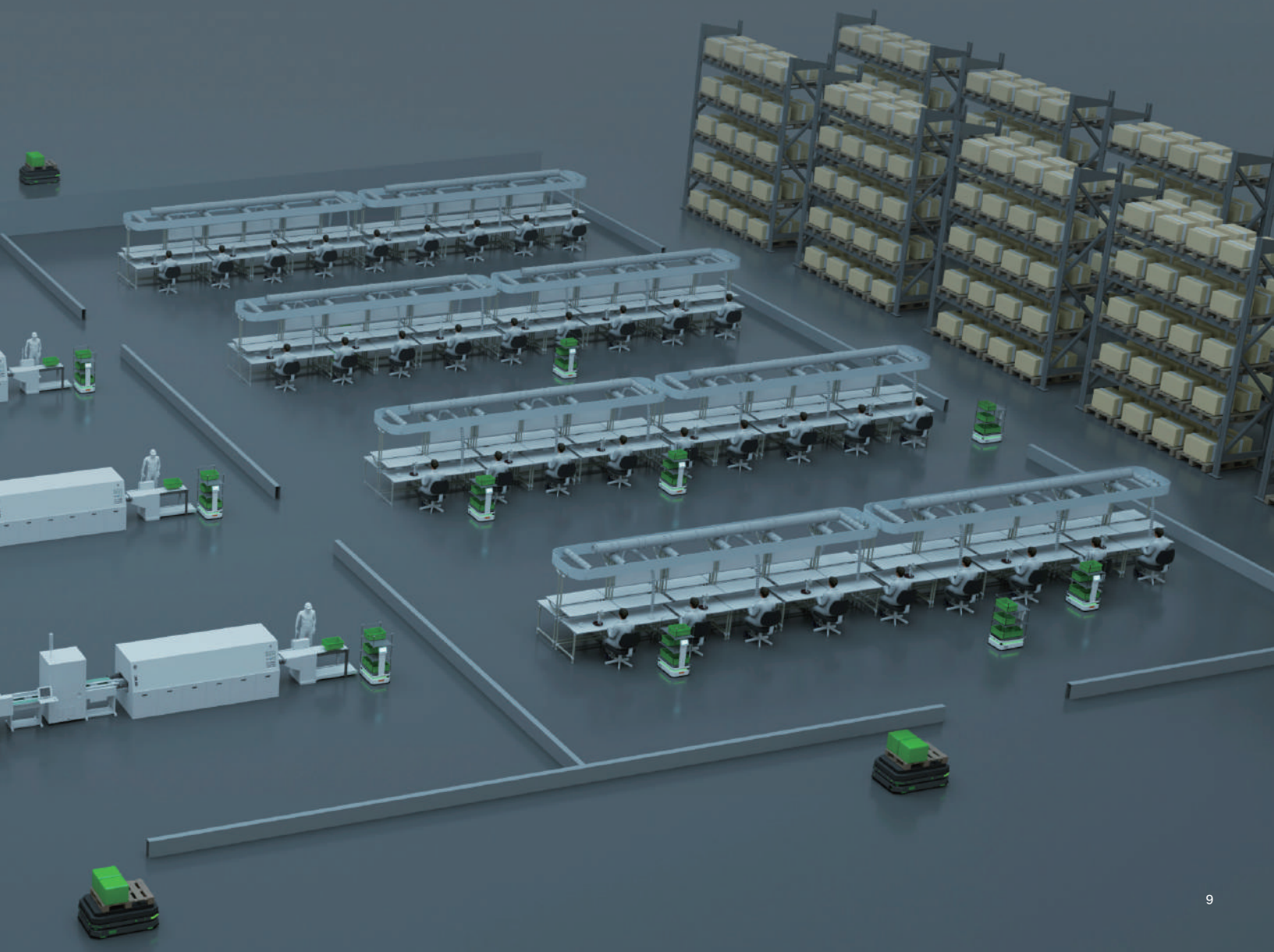
Reliability: Uptime Availability of 99.5%
f(x) continuously coordinates the autonomous fleet for hands-free operations and best-in-class uptime. Automate your operations to increase predictability, reducing delays and minimizing your need for manual intervention.

Efficiency: Cycle Time Reduction
Reliable workflows improve the cadence of production and reduce waiting times. Meet your demand quicker by reducing start-to-finish production time with fewer delays.

Flexibility: Changeover Speed Increase
AMR workflows can be modified in real-time with a simple click. Reduce your changeover times and increase operational agility using f(x)'s map builder.

Savings: 50% Reduction in Labor Costs
Automating undesirable work and redeploying workers reduces recruitment requirements and keeps the workforce happy. Use ForwardX solutions to decrease turnover and bring down costs.

Payback: ROI in <2 Years
AMRs deliver a return on investment in under 2 years. Instead of waiting 5–10 years for payback, use AMRs for a quick deployment with flexible payment options, without any need for infrastructure changes.



Automotive: Warehouse-to-Line

Solutions

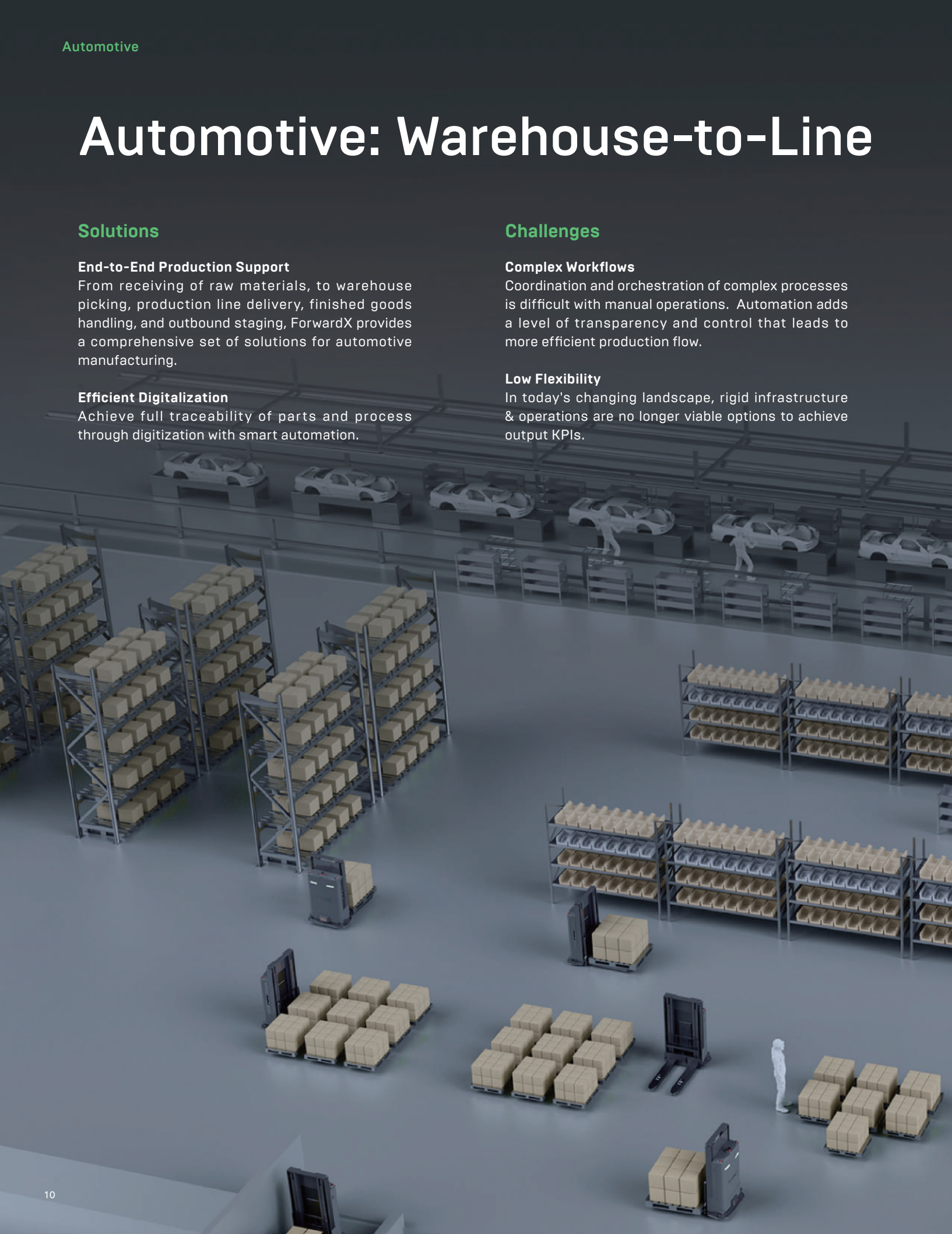
End-to-End Production Support
From receiving of raw materials, to warehouse picking, production line delivery, finished goods handling, and outbound staging, ForwardX provides a comprehensive set of solutions for automotive manufacturing.

Efficient Digitalization
Achieve full traceability of parts and process through digitization with smart automation.

Challenges

Complex Workflows
Coordination and orchestration of complex processes is difficult with manual operations. Automation adds a level of transparency and control that leads to more efficient production flow.

Low Flexibility
In today's changing landscape, rigid infrastructure & operations are no longer viable options to achieve output KPIs.

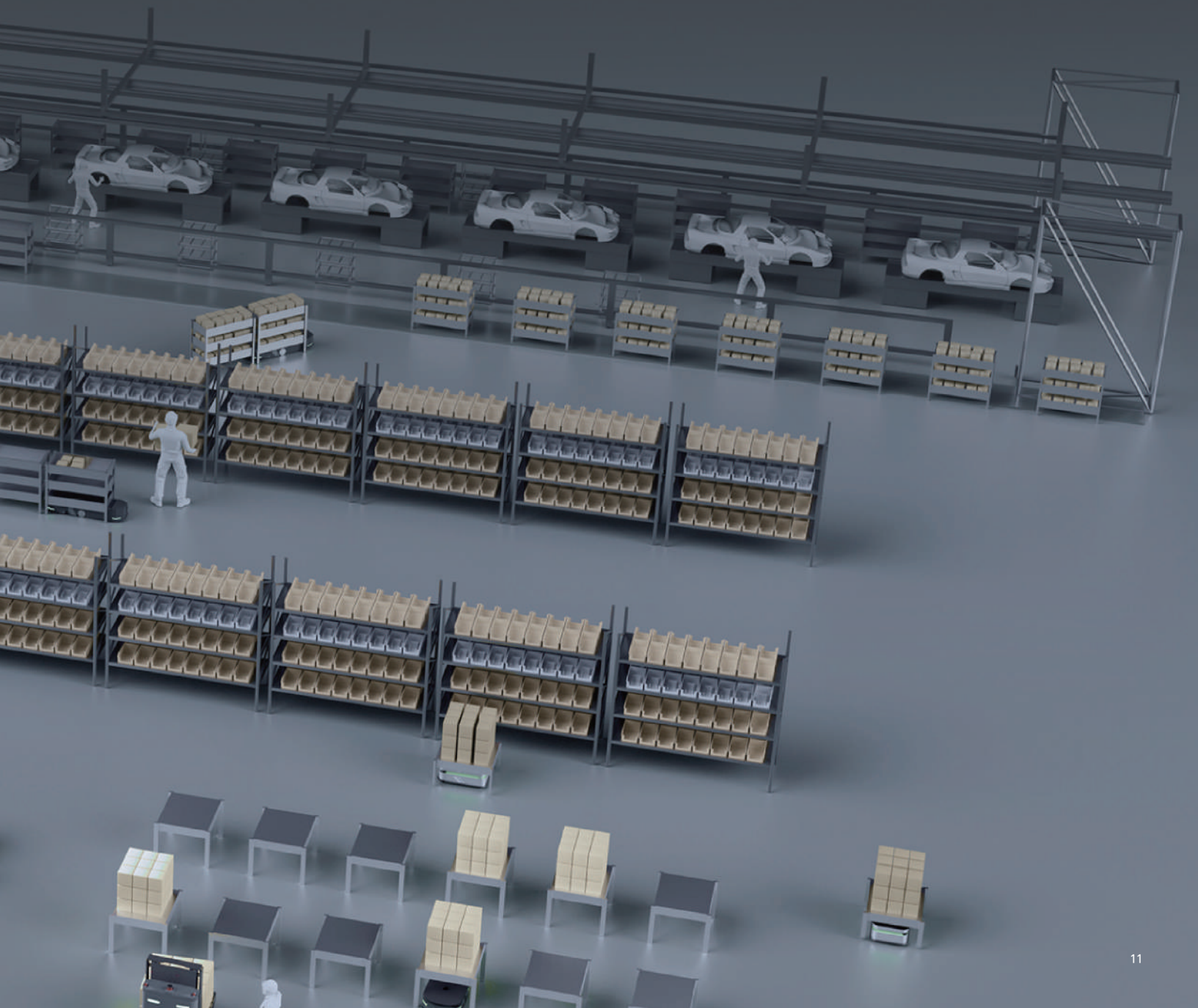


Delivering Value

Autonomous Material Transport
Automatically organize and deliver KLT, GLT, SLT, and other materials in batch and JIT workflows.

Industry 4.0

Digital Optimization
Analysis of robot operational data through smart BI and visualization tools, ForwardX helps you optimize your operations for maximum efficiency in real-time.



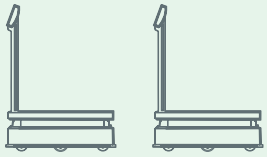
ForwardX Matrix

The Flexible Automation Platform

ForwardX Matrix seamlessly connects with your existing software infrastructure. Once WMS is connected, the platform autonomously orchestrates your operations for maximum productivity while offering you deep insight into and control of every inch of your facility.

Top Modules and Add-ons for Smart Warehousing

Powered by
ForwardX Cortex



ForwardX Flex®
Visual Autonomous Mobile Robots
for up to 600kg (1,322 lbs)

Perfect for small to medium load movements like picking, Flex AMRs collaborate with human workers to remove unproductive tasks like long-distance walking and increase the efficiency and accuracy of human work.

ForwardX Max®
Visual Autonomous Mobile Robots
for up to 2,500 kg (5,511 lbs)

Built for medium to high payloads up to 2,500 kg (5,511 lbs), Max and Max L AMRs support the automation of multiple workflows across your warehouse including heavy piece, case, and pallet picking.

Your Systems
WMS, WCS

Seamlessly connects with f(x) through API integration, transmitting vital data back and forth from f(x).

f(x) Fleet Manager

f(x) Core
Edge-Based Robot Control System

Integrates with f(x) Plus and uses intelligent cluster scheduling technology to give you best-in-class automated capabilities.

f(x) Plus
Cloud-Based Business Management Platform

Connects with your existing systems to intelligently orchestrate efficient business processes and drive effective man-machine collaboration. Using algorithm optimization, f(x) Plus improves your business operations.

Tailored Scenario for Smart Warehousing

Other Scenarios (Retail, Health)

f(x) Dashboard
Desktop Application

Built for management level staff to control operations, track performance, and analyze data, f(x) Dashboard gives you a birds-eye view of your facility.

f(x) Mobile
Mobile Application for PDAs, Smart Watches, and Cellphones

Used by warehouse operators, supervisors, and other staff on the floor, f(x) Mobile improves human performance through directed workflows that help workers focus on value-adding activities.

ForwardX Flex AMRs

Intelligently Reshaping Warehousing and Manufacturing Business Processes

The Flex 300-L is specifically designed for ultra-narrow aisles, allowing for agile navigation in confined workspaces. Equipped with a lightweight body and an intelligent lifting system, it can adapt to narrow aisle challenges.

The Flex 300-LS is equipped with a lifting function for autonomous rack docking and an interactive touchscreen with customizable UI for operation efficiency improvement.

The Flex 300-SCB is tailored for warehouse picking and sorting tasks. Its compact design is ideal for narrow aisles, greatly improving operational space flexibility and efficiency. Additionally, it offers optional printer and barcode scanner integration for enhanced functionality.

Flex 300-L

Flex 300-LS

Flex 300-SCB

	Flex 300-L	Flex 300-LS	Flex 300-SCB
Dimensions			
Length	910 mm (35.82 in)	910 mm (35.82 in)	960 mm (37.79 in)
Width	500 mm (19.68 in)	500 mm (19.68 in)	505 mm (19.88 in)
Height	295 mm (11.61 in)	1,240 mm (48.81 in)	1,395 mm (54.92 in)
Turning Diameter	960 mm (37.79 in)	960 mm (37.79 in)	1,088 mm (42.83 in)
Ground Clearance	25 mm (0.98 in)	25 mm (0.98 in)	25 mm (0.98 in)
Load Surface	700x400 mm (27.55x15.74 in)	700x400 mm (27.55x15.74 in)	Level 1 : 808x490 mm (31.81x19.29 in) Level 2 & 3 : 808x470 mm (31.81x18.50 in)
Lifting Height	60 mm (2.36 in)	60 mm (2.36 in)	-
Payload			
Weight	120 kg (264 lbs)	170 kg (374 lbs)	170 kg (374 lbs)
Max. Payload	300 kg (661 lbs)	300 kg (661 lbs)	300 kg (661 lbs)
Performance			
Navigation Mode	Real-time Optimal / Road Network / Hybrid	Real-time Optimal / Road Network / Hybrid	Real-time Optimal / Road Network / Hybrid
Positioning Mode	Laser SLAM / Visual / Ground QR code / Wall QR Code	Laser SLAM / Visual / Ground QR code / Wall QR Code	Laser SLAM / Visual / Ground QR code / Wall QR Code
Max. Speed	2.0 m/s	2.0 m/s	2.0 m/s
Docking Accuracy	±5 mm (0.19 in) / ±0.5 ° *	±5 mm (0.19 in) / ±0.5 ° *	±5 mm (0.19 in) / ±0.5 ° *
Communication			
Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Yes	Yes	Yes
Cellular Network (Public 4G/5G)	Optional	Optional	Optional
Power			
Endurance	~8 hrs Per Charge	~8 hrs Per Charge	~8 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC	DC CC-VC
Sensors			
LiDAR	4	4+1/3D	4
UWA Cameras	1 (Front)	1 (Front)	1 (Front)
3D Cameras	1 (Front)	1 (Front)	1 (Front)
Odometer	1	1	1
IMU	1	1	1
Interaction			
Audio	Yes	Yes	Yes
Lights	Yes	Yes	Yes
Configuration Screen	-	-	-
Pallet Hump	Optional	Optional	-
Safety			
Safety Bumper	Yes	Yes	Yes
Emergency Stop Button	2	2	2
Movement Obstacle Perception	Yes	Yes	Yes
Audible And Visual Alarm	Yes	Yes	Yes
Compliance			
CE	Yes	Yes	Yes

Optional Accessories

Single-layer Rack With Wheels

Triple-layer Rack With Wheels

Material Container

*Docking Accuracy: Under special deployment conditions, without verifying multi-AMR consistency. *The information, pictures, and claims made in this document are for reference purposes only.

ForwardX Flex AMRs

Intelligently Reshaping Warehousing and Manufacturing Business Processes

The Flex 600-L boasts a thinner and sleeker body design, increased payload capacity, and an intelligent lifting system, making it compatible with a wider range of racks and carts. This new model is equipped with four LiDAR sensors for 360-degree obstacle recognition and avoidance.

The Flex 600-LS features an intuitive touchscreen for enhanced operational efficiency, a lifting function that handles payloads up to 600 kg (1,322 lbs), and a thinner design for improved adaptability to various container types.

The Flex 600-SCB is suitable for picking scenarios, with a maximum load capacity of 600 kg (1,322 lbs). It features a modular multi-layer board design, allowing the number of layers to be increased or decreased as needed. Equipped with light-guided picking, it enhances sorting efficiency. The enlarged layer boards can accommodate more goods. It supports optional integration of peripherals such as printers and barcode scanning modules.

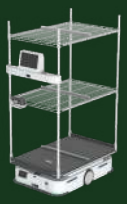
Flex 600-L

Flex 600-LS

Flex 600-SCB

Flex 600-L

Flex 600-LS



Flex 600-SCB

Dimensions

	Flex 600-L	Flex 600-LS	Flex 600-SCB
Length	1,005 mm (39.56 in)	1,005 mm (39.56 in)	1,005 mm (39.56 in)
Width	690 mm (27.16 in)	690 mm (27.16 in)	690 mm (27.16 in)
Height	245 mm (9.64 in)	1,200 mm (47.24 in)	1,730 mm (68.11 in)
Turning Diameter	1,130 mm (44.48 in)	1,130 mm (44.48 in)	1,130 mm (44.48 in)
Ground Clearance	20 mm (0.78 in)	20 mm (0.78 in)	20 mm (0.78 in)
Load Surface	950x650 mm (37.40x25.59 in)	950x650 mm (37.40x25.59 in)	630x960 mm (24.80x37.79 in)
Lifting Height	60 mm (2.36 in) (Tolerance +0,-5 mm (-0.19 in))*	60 mm (2.36 in) (Tolerance +0,-5 mm (-0.19 in))*	-

Payload

Weight	150 kg (330 lbs)	160 kg (352 lbs)	190 kg (418 lbs)
Max. Payload	600 kg (1,322 lbs)	600 kg (1,322 lbs)	600 kg (1,322 lbs)

Performance

Navigation Mode	Real-time Optimal / Road Network /Hybrid	Real-time Optimal / Road Network / Hybrid	Real-time Optimal / Road Network / Hybrid
Positioning Mode	Laser SLAM / Visual / Ground QR code /Wall QR Code	Laser SLAM / Visual / Ground QR code / Wall QR Code	Laser SLAM / Visual / Ground QR code / Wall QR Code
Max. Speed	2.0 m/s	2.0 m/s	2.0 m/s
Docking Accuracy	±5 mm (0.19 in) / ±0.5 ° *	±5 mm (0.19 in) / ±0.5 ° *	±5 mm (0.19 in) / ±0.5 ° *

Communication

Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Yes	Yes	Yes
Cellular Network (Public 4G/5G)	Optional	Optional	Optional

Power

Endurance	~8 hrs Per Charge	~8 hrs Per Charge	~8 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC	DC CC-VC

Sensors

LiDAR	2	2+1/3D	2
UWA Cameras	1 (Front)	1 (Front)	1 (Front)
3D Cameras	1 (Front)	1 (Front)	1 (Front)
Odometer	1	1	1
IMU	1	1	1

Interaction

Audio	Yes	Yes	Yes
Lights	Yes	Yes	Yes
Configuration Screen	Yes	Yes	Yes
Pallet Hump	Optional	Optional	-

Safety

Safety Bumper	Yes	Yes	Yes
Emergency Stop Button	2	2	2
Movement Obstacle Perception	Yes	Yes	Yes
Audible And Visual Alarm	Yes	Yes	Yes

Compliance

CE	Yes	Yes	Yes

Optional Accessories

Pallet Station

Euro Pallet Station + Hump

Triple-layer Rack

Pallet Lifting Station

*Docking Accuracy: Under special deployment conditions, without verifying multi-AMR consistency. *The information, pictures, and claims made in this document are for reference purposes only.

ForwardX Max AMRs

Point-to-Point, End-to-End Smart Transportation

Max 1500-L is specifically designed for case picking applications. With full 360° obstacle detection and avoidance, a loading capacity of 1,500 kg (3,306 lbs), highly precise docking capabilities and lifting functions for pallets and racks, it excels in safely and efficiently transporting medium-sized and heavier goods in case picking scenarios.

Max O2500-L supports omnidirectional towing with a maximum load capacity of 2,500 kg (5,511 lbs), capable of operating flexibly in relatively restricted working environments, greatly enhancing the flexibility and safety of production lines. At the same time, the AMR is equipped with a powerful jacking system that can support the jacking of oversized shelves, helping to improve productivity and ease of work.

Max 1500-L

Max O2500-L

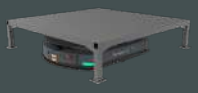
	Max 1500-L	Max 02500-L
Dimensions		
Length	1,300 mm (51.18 in)	2,100 mm (82.67 in)
Width	890 mm (35.03 in)	1,100 mm (43.30 in) (Customizable)
Height	245 mm (9.64 in)	310 mm (12.20 in) (Customizable)
Turning Diameter	1,300 mm (51.18 in)	2,239 mm (88.14 in)
Ground Clearance	25 mm (0.98 in)	30 mm (1.18 in)
Load Surface	1,240x830 mm (48.81x32.67 in)	2,100x1,100 mm (82.67x43.30 in)
Lifting Height	60 mm (2.36 in) (Tolerance +0,-5 mm (-0.19 in))*	145 mm (5.70 in) (Tolerance +0,-5 mm (-0.19 in))*
Payload		
Weight	250 kg (551 lbs)	700 kg (1,543 lbs)
Max. Payload	1,500 kg (3,306 lbs)	2,500 kg (5,511 lbs) (Customizable)
Performance		
Navigation Mode	Real-time Optimal / Road Network / Hybrid / Fllowing	Real-time Optimal / Road Network / Hybrid / Fllowing
Positioning Mode	Laser SLAM / Visual / Optional QR Code Navigation	Laser SLAM / Visual / Optional QR Code Navigation
Max. Speed	1.6 m/s	0.84 m/s
Docking Accuracy	±5 mm (0.19 in) / ±0.5 ° *	±10 mm (0.39 in)
Communication		
Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Yes	Yes
Cellular Network (Public 4G/5G)	Optional	Optional
Power		
Endurance	~8 hrs Per Charge	~7 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC
Q.D.	-	Yes
Sensors		
LiDAR	4	2
UWA Cameras	1 (Front)	2 (Front)+2 (Side)
3D Cameras	Yes	Optional
QR Code Cameras-downward	Optional	Yes
Odometer	Yes	Yes
IMU	Yes	Yes
Interaction		
Audio	Yes	Yes
Lights	Yes	Yes
Configuration Screen	Yes	Yes
Pallet Hump	Optional	-
Safety		
Safety Bumper	Yes	Yes
Emergency Stop Button	2	4
Movement Obstacle Perception	Yes	Yes
Audible And Visual Alarm	Yes	Yes
Compliance		
CE	Yes	Optional

Optional Accessories

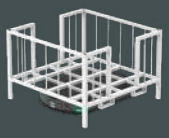
Euro Pallet Station + Hump

Pallet Station

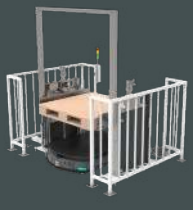
Single-layer Rack With Wheels



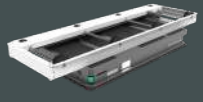
Single-layer Rack



Material Rack



Pallet Lifting Station



Roller Conveyor

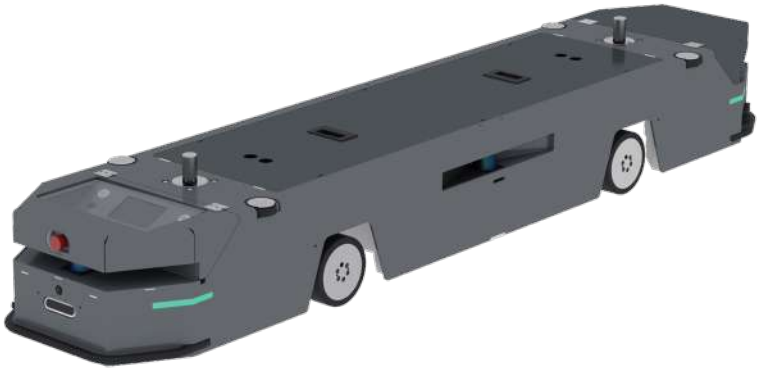
*Docking Accuracy: Under special deployment conditions, without verifying multi-AMR consistency. *The information, pictures, and claims made in this document are for reference purposes only.

ForwardX Lynx AMRs

Redifining Flexibility in the Automotive Industry

The Lynx series is designed to solve pain points in the automotive manufacturing industry. Lynx uses deep learning computer vision paired with a LiDAR-based SLAM navigation system making it suitable for stable operations in a complex environment. It works alongside personnel, other AMRs, and customers' existing automation equipment without a need for remodeling or laying out magnetic strips or other fixed routes. Lynx is the most flexible AMR built for the automotive industry that is driving efficiency with rapid deployment and leading to quick ROI.

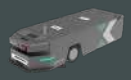
Lynx U1000



Lynx O1500

Optional Accessories

Towing Cart



	Lynx U1000	Lynx O1500
Dimensions		
Length	1,250~1,550 mm (49.21~61.02 in) (Customizable)	2,200 mm (86.61 in)
Width	440 mm (17.32 in)	440 mm (17.32 in)
Height	285 mm (11.22 in)	285 mm (11.22 in)
Turning Diameter	3,108 mm (122.36 in)	2,254 mm (88.74 in)
Ground Clearance	25 mm (0.98 in)	25 mm (0.98 in)
Lifting Height	50 mm (1.96 in)	50 mm (1.96 in)
Payload		
Weight	240 kg (529 lbs)	340 kg (749 lbs)
Max. Payload	1,000 kg (2,204 lbs)	1,500 kg (3,306 lbs)
Performance		
Navigation Mode	Real-time Optimal / Road Network / Hybrid	Real-time Optimal / Road Network / Hybrid
Positioning Mode	Laser SLAM / Visual / Optional QR Code Navigation	Laser SLAM / Visual / Optional QR Code Navigation
Max. Speed	0.8 m/s	0.8 m/s
Docking Accuracy	±20 mm (0.78 in) / ±1 °	±15 mm (0.59 in) / ±1 °
Function		
Towing Hook	1	2
Communication		
Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Optional	Optional
Cellular Network (Public 4G/5G)	Optional	Optional
Power		
Endurance	~8 hrs Per Charge	~9 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC
Q.D.	Yes	Yes
Sensors		
LiDAR	1	4
UWA Cameras	1 (Front)	2 (Front)
3D Cameras	Optional	Optional
QR Code Cameras-downward	Yes	Yes
Odometer	Yes	Yes
IMU	Yes	Yes
Interaction		
Audio	Yes	Yes
Lights	Yes	Yes
Configuration Screen	Yes	Yes
Safety		
Safety Bumper	Yes	Yes
Emergency Stop Button	2	2
Movement Obstacle Perception	Yes	Yes
Audible And Visual Alarm	Yes	Yes
Compliance		
CE	Optional	Yes

*The information, pictures, and claims made in this document are for reference purposes only.

ForwardX Apex AMRs

The Optimal Autonomous Forklift

There are two important types of Apex series autonomous forklifts: **Apex 1400-L** pallet stacker forklift, and **Apex C1500-L** counterbalanced forklift.

Apex 1400-L CAPACITY CHART

h3(mm)	Q(kg)				
3500	700	500	300		
3000	1000	850	700		
2500	1200	1000	850		
1600	1400	1200	1200		
	600	700	800		

LOAD CENTER (mm)

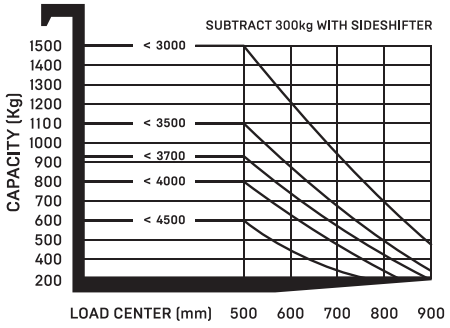
outer width of the forks 680

h3(mm)	Q(kg)				
3500	500	300	100		
3000	800	650	500		
2500	1000	800	650		
1600	1400	1200	1000		
	600	700	800		

LOAD CENTER (mm)

outer width of the forks 560

Apex C1500-L CAPACITY CHART



***For Apex 1400-L:**
When the outer width of the forks is greater than 620, the load curve is executed according to a width of 680.When the outer width of the forks is between 560 and 620, the load curve is executed according to a width of 560.

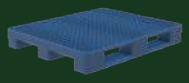
Apex 1400-L

Apex C1500-L

	Apex 1400-L	Apex C1500-L
Dimensions		
Length	1,763 mm (69.40 in)	2,570 mm (101.18 in)
Width	1,027 mm (40.43 in)	1,155 mm (45.47 in)
Height	2,244 mm (88.34 in)	2,274 mm (89.52 in)
Turning Diameter	2,260 mm (88.97 in)	2,750 mm (108.26 in)
Aisle Width (Ast)	2,395 mm (94.29 in)* (Pallet 1,200x800 mm)	3,058 mm (120.39 in) * (Pallet 1,200x1,000 mm)
Payload		
Weight	880 kg (1,940 lbs)	2,700 kg (5,952 lbs)
Max. Payload	1,400 kg (3,086 lbs)	1,500 kg (3,306 lbs)
Function		
Fork Dimensions	1,150/170/60 mm (45.27/6.69/2.36 in)	1,150/100/40 mm (45.27/3.93/1.57 in)
Fork Carriage Width	680/560 mm (26.77/22.04 in)	680/560/460 mm (26.77/22.04/18.11 in)
Default Fork Height	90 mm (3.54 in)	60 mm (2.36 in)
Max. Fork Height	1,600 mm (62.99 in)-1,400 kg (3,086 lbs)	3,000 mm (118.11 in)-1,500 kg (3,306 lbs)
(Customizable)	3,500 mm (137.79 in)	4,500 mm (177.16 in)
Load Center Distance	600 mm (23.62 in)	600 mm (23.62 in)
Pallet Compatibility	Euro Pallets, Customized Pallets*	Euro Pallets, GMA Pallets, Customized Pallets*
Performance		
Navigation Mode	Road Network / Preferred Route / Real-time Optimal	Road Network / Preferred Route / Hybrid
Positioning Mode	Laser SLAM / Visual Semantics	Laser SLAM / Visual Semantics / Optional QR Code Navigation
Max. Speed	1.6 m/s	1.6 m/s
Docking Accuracy	±10 mm (0.39 in) / ±1 °	±5 mm (0.19 in) / ±0.5 ° *
Communication		
Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Yes	Yes
Cellular Network (Public 4G/5G)	Optional	Optional
Power		
Endurance	~10 hrs Per Charge	~8 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC
Sensors		
Lidar	5 (3/3D+2/2D)	5 (3/3D+2/2D)
UWA Cameras	1+3 (TSA)	2+3 (TSA)
Pallet In-Place Sensor	2	2
Pallet Off-Position Sensor	-	2
QR Code Cameras-downward	-	Yes
Safety		
Safety Bumper	Yes	Yes
Emergency Stop Button	2	2
Compliance		
CE	Yes	Yes

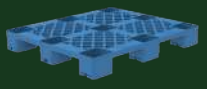
*Docking Accuracy: Under special deployment conditions, without verifying multi-AMR consistency. *The information, pictures, and claims made in this document are for reference purposes only.

Optional Accessories



Plastic Euro Pallet

Euro Pallet



Nine-leg Pallet

EPAL Box

CHEP Pallet
(Apex C1500-L Only)

GMA Pallet
(Apex C1500-L Only)

ForwardX Apex AMRs

The Optimal Autonomous Forklift

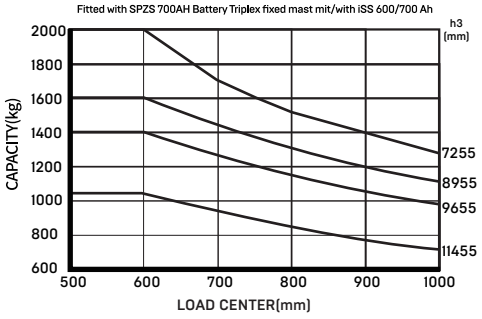
The **Apex 2000-G** forklift, designed for logistics and manufacturing warehouses, integrates pallet picking and horizontal transportation to address large/medium-sized material order-picking and point-to-point pallet transport scenarios.

The **Apex R2000-L** autonomous reach truck is engineered to optimize efficiency and safety.This model features an impressive 2,000 kg (4,409 lb) high load capacity, with an automatic docking lifting height of up to 7,255 mm (285.63 in) and a maximum manual docking lifting height of 11,455 mm (450.98 in). These specifications make it ideally suited for high-density warehousing environments, combining robust load-bearing capability with precise lifting versatility to optimize storage efficiency.

Apex 2000-G

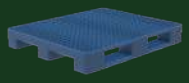
Apex R2000-L

Apex R2000-L CAPACITY CHART



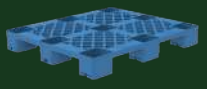
	Apex 2000-G	Apex R2000-L
Dimensions		
Length	1,953 mm (76.89 in)	2,575 mm (101.38 in)
Width	933 mm (36.73 in)	1,270 mm (50.00 in)
Height	2,102 mm (82.76 in)	2,480 mm (97.64 in)
Turning Diameter	3,520 mm (138.58 in)*	3,725 mm (146.65 in)
Ground Clearance	30 mm (1.18 in)	75 mm (2.95 in)
Aisle Width (Ast)	2,542 mm (100 in)* (Pallet 1,200x1,000 mm)	3,120 mm (122.83 in)* (Pallet 1,200x1,000 mm)
Payload		
Weight	630 kg (1,388 lbs)	3,400 kg (7,495 lbs)
Max. Payload	2,000 kg (4,409 lbs)	2,000 kg (4,409 lbs)
Function		
Length of Fork	1,200 mm (47.24 in)	1,056 mm (41.57 in)
Width of Fork	170 mm (6.69 in)	103 mm (4.06 in)
Height of Fork	60 mm (2.36 in)	45 mm(1.77 in)
Fork Carriage Width	540/685 mm (21.26/26.97 in)	680 mm (26.77 in)
Standard Automatic Docking Lifting Height	110 mm (4.33 in)	5,440 mm (214.17 in)
Customized Mast Automatic Docking Lifting Height	-	7,255 mm (285.63 in)* (In the 2026)
Customized Mast Max. Manual Docking Lifting Height	-	11,455 mm (450.98 in)
Load Center Distance	600 mm (23.62 in)	600 mm (23.62 in)
Pallet Compatibility	GMA Pallets (Optional),Euro Pallets*	GMA Pallets,Euro Pallets*
Performance		
Navigation Mode	Road Network / Preferred Route / Hybrid	Road Network / Preferred Route / Hybrid
Positioning Mode	Laser SLAM / Visual Semantics	Laser SLAM / Visual Semantics/ Optional QR Code Navigation
Max. Speed	2.0 m/s	2.0 m/s
Docking Accuracy	±10 mm (0.39 in) / ±1 °	±5 mm (0.19 in) / ±0.5 ° *
Communication		
Wi-Fi (IEEE 802.11a/b/g/n/ac)	Yes	Yes
Wi-Fi (IEEE 802.11ax)	Yes	Yes
Cellular Network (Public 4G/5G)	Optional	Optional
Power		
Endurance	~8 hrs Per Charge	~8 hrs Per Charge
Charging Mode	DC CC-VC	DC CC-VC
Sensors		
Lidar	6 (3/3D+3/2D)	8 (5/3D+3/2D)
UWA Cameras	1+4 (TSA)	2+5 (TSA)
Pallet In-Place Sensor	Yes	2
Pallet Off-Position Sensor	Yes	2
QR Code Cameras-downward	-	Yes
Safety		
Safety Bumper	Yes	-
Emergency Stop Button	3	5
Compliance		
CE	Yes	Yes

Optional Accessories



Plastic Euro Pallet

Euro Pallet



Nine-leg Pallet

EPAL Box

CHEP Pallet

GMA Pallet

*Docking Accuracy: Under special deployment conditions, without verifying multi-AMR consistency. *The information, pictures, and claims made in this document are for reference purposes only.

ForwardX Conveyor AMRs

Automatic Loading, Unloading, and Docking with AS/RS

ForwardX Conveyor AMRs are suitable for transporting and handling a variety of containers including totes and pallets. They can be incorporated with your existing production lines or automatic storage and retrieval systems (AS/RS).

Our Conveyor AMRs are extensions of our Flex and Max series. Depending on your business needs, these AMRs can be customized to include up to two layers and two rows of rollers, such as one row on the bottom layer with two rows on the top layer.

Conveyor accessories can be customized according to customer requirements.

Flex 600 Conveyor
2 Layers, 2 Rows

Length	1,050 mm (41.30 in)
Width	650 mm (25.60 in)
Height	1,186 mm (46.70 in)
Payload Capacity	100 kg (220 lbs) Per Shelf
Load Surface Area	650x365x200 mm (25.60x14.30x7.90 in)
Loading Height	Bottom Layer: 555 mm (21.80 in) Top Layer: 1,150 mm (45.30 in)

Conveyor 1 Layers, 2 Rows

Conveyor 2 Layers, 1 Row

Conveyor 1 Layer, 1 Row

Reflex Charging Station

Smart, Robust and Space-efficient

The ForwardX Reflex charging station serves as a crucial component, providing essential charging support for the fleet. It handles charging tasks with impressive speed and energy capacity, incorporating multiple safety protections to safeguard both employees and AMRs within your facility.

Three available models are capitable with different series of AMRs.

CS- 30050-S
CS- 30100-S

CS- 40070-GD

CS-30050-S

CS-30100-S

CS-40070-GD

Dimensions	**Length**	600 mm (23.62 in)	600 mm (23.62 in)	600 mm (23.62 in)
	Width	300 mm (11.81 in)	300 mm (11.81 in)	300 mm (11.81 in)
	Height	285 mm (11.22 in)	285 mm (11.22 in)	285 mm (11.22 in)
	Weight	30 kg (66 lbs)	30 kg (66 lbs)	30 kg (66 lbs)
	Contact Mount Bracket Length	73 mm (2.87 in)	73 mm (2.87 in)	-
	Contact Mount Ground Clearance	95 mm (3.74 in)	120 mm (4.72 in)	10.5 mm (0.41 in)
Input	**Input Voltage**	AC 220 V	AC 220 V	AC 220 V
	Input Current	14 A	15 A	20 A
	Rated Power	3000 W	3000 W	4000 W
	Plug Type	GB/T 16A	GB/T 16A	ABC 25A
Output	**Output Voltage**	DC 54.75 V	DC 29.2 V	DC 54.75V
	Maximum Output Current	50 A	100 A	70 A
Environment	**IP Rating**	IP20	IP20	IP20
	Ambient Temperature Range	0-40°C	0-40°C	0-40°C
	Humidity (Non-condensing)	5-85 %	5-85 %	5-85 %
Safety	**Output Over Current Protection**	Yes	Yes	Optional
	Output Short Circuit Protection	Yes	Yes	Yes
	Output Over Voltage Protection	Yes	Yes	Yes
	Input Over Voltage Protection	Yes	Yes	Yes
	Input Under Voltage Protection	Yes	Optional	Yes
	Output High Voltage Shutdown Protection	Optional	Optional	Optional
	Over Temperature Protection	Yes	Yes	Yes
	Output Anti Reverse Protection	Optional	Optional	Optional
Compatibility	**Compatible With AMR Series**	Flex Series Max Series Apex 2000	Apex 1400-L Apex C1500-L	Max O2500-L Lynx Series

OptiX System

SYSTEM OVERVIEW

OptiX system is a computer vision-based environmental perception system.By deploying 2D/3D vision sensors in the environment, it identifies the status of designated areas and outputs recognition results to the robot scheduling system to assist AMR operations.OptiX system can be equipped with 3D vision sensors to identify the position and height of goods. Compared to 2D vision, its key advantage lies in generating a spatial depth map, enhancing warehouse efficiency and safety.

The OptiX system, along with its assigned servers, cameras, and network equipment, operates as an independent system. It features capabilities including image acquisition, status recognition, and object detection,encapsulated into standard interfaces for integration with robot scheduling systems or third-party clients.

FUNCTIONAL SPECIFICATIONS

1-STORAGE LOCATION STATUS PERCEPTION

› Identifies targets in storage areas

*Additional categories can be added based on actual usage scenarios.

Shelves | Goods | Clutter | Vacant Land | Humans | AMRs | Manual Forklifts

2-USE CASES

› Shelf Presence Detection

Detects whether a shelf is present at a location to enable flexible, intelligent warehouse management and seamless coordination between workers and AMRs.

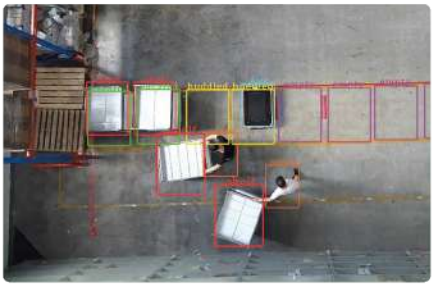
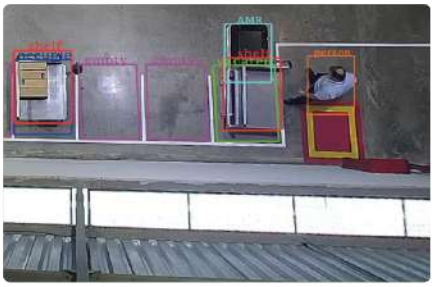
› Shelf Load Status (Full/Empty)

Identifies shelf load conditions to support mixed placement, enhancing operational efficiency and storage organization.

› Goods Height Recognition

Leverages 3D cameras to precisely measure the height of goods, allowing forklifts to intelligently select optimal storage locations based on zone-specific height constraints. This greatly improves stacking accuracy, maximizes warehouse capacity, and boosts overall storage efficiency.

Application Scenario Image Display

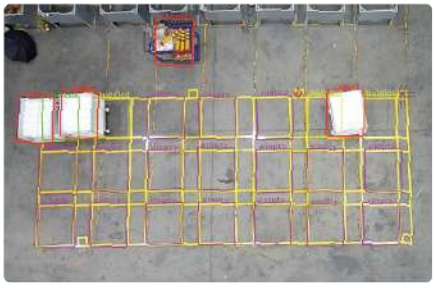
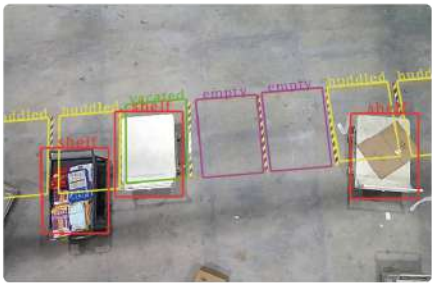
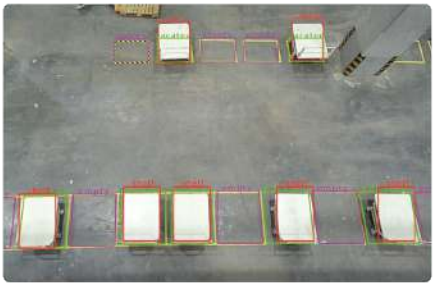




Using one of the supported cameras for OptiX as an example, the relationship between the recognition area and the camera installation height is shown in the table below.

*Effective height refers to the distance from the camera to the top surface of the goods.

Effective Height	Regional Area
3.5 m (11.48 ft)	5.6*3.2 m (18.37*10.50 ft)
5 m (16.40 ft)	8*4.5 m (26.25*14.76 ft)
8 m (26.25 ft)	12.8*7.2 m (41.99*23.62 ft)
10 m (32.81 ft)	16*9 m (52.49*29.53 ft)

Recognition Range Scenario Diagram Display

3-LIMITATIONS

› The OptiX system may not perform as expected on uneven or cracked surfaces

› Accuracy cannot be guaranteed under extreme or highly variable lighting conditions

Maintain stable lighting (without interference from natural light changes) in monitored areas.

› Recognition may fail if:

- Goods occupy <10cm² area on shelves.
- Shelves exhibit significant damage/rust.

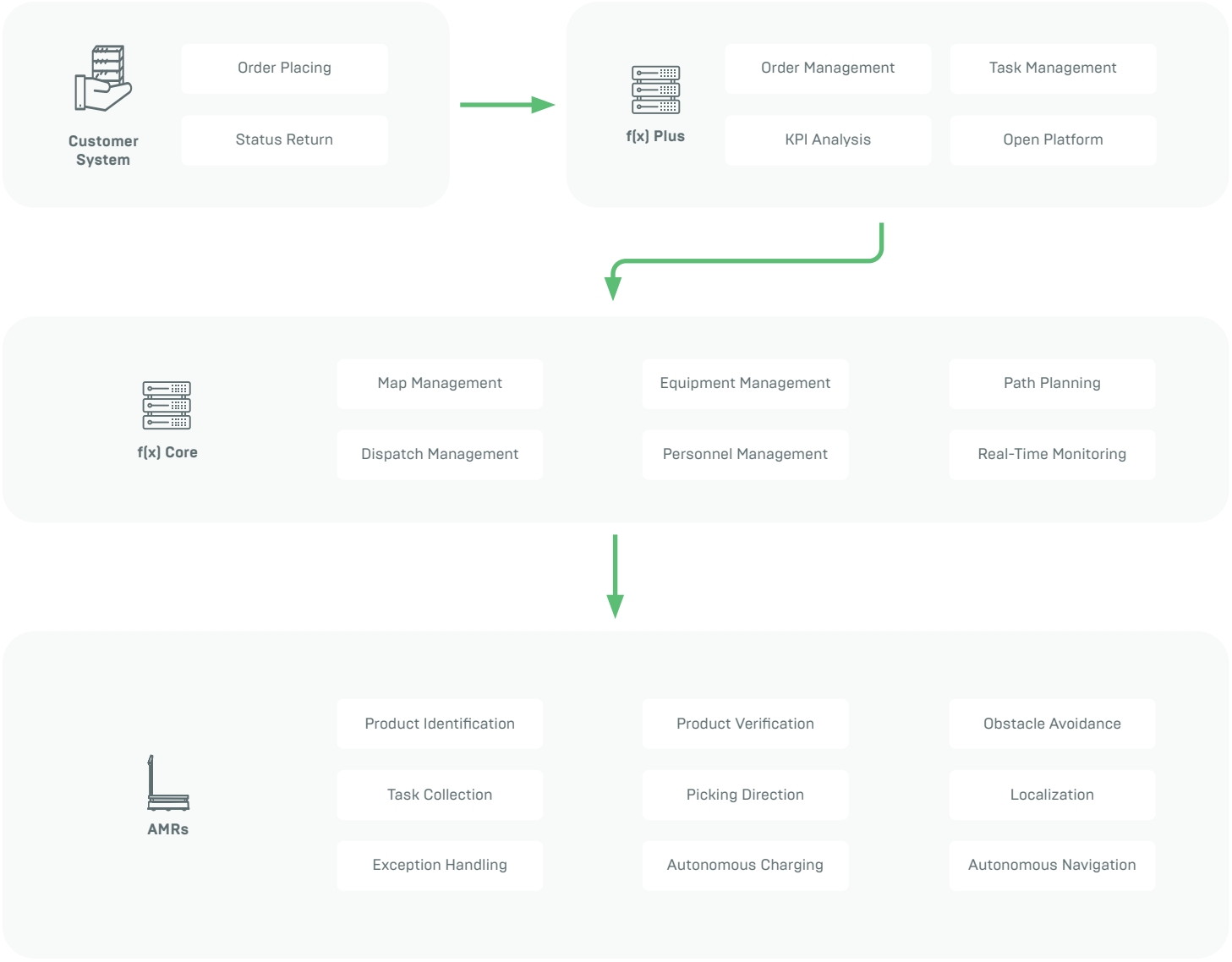
4-EFFECTIVE COVERAGE AREA

To ensure optimal viewing angles, OptiX cameras must be mounted vertically downward.
-Effective coverage area is calculated based on installation height and types of cameras.
-The number of covered points varies by site layout and requires case-specific calculation.

f(x) Fleet Manager

Take Control of Your Warehouse

ForwardX f(x) Fleet Manager is an Industry 4.0-compatible solution that provides end-to-end automation and future-proof digitization. Acting as your command center, f(x) Fleet Manager connects with your software platforms to receive, optimize, and dispatch tasks in one central location.



Key Features

Unmatched AMR Fleet Capacity

Expand your fleet with no growing pains. Our best-in-class machine learning algorithms ensure your Fleet Manager will intelligently manage and orient your robots to their environment, regardless of robot density, rack density, or picking strategy.

Traffic & Congestion Control

Relieve congestion and alleviate inefficiency caused by traffic with a truly intelligent solution. Our Fleet Manager provides machine learning-based traffic and congestion control to address bottlenecks, like auto-door delays from required manual intervention.

Productivity and Efficiency Tracking

Understand how productive and efficient your fleet can be as you watch in real-time. Our dashboards provide customization so that you can see exactly how your fleet operates, helping you make changes where they matter.

Optimized Battery Management for 24/7 Operation

Benefit from superior uptime effortlessly. ForwardX's Fleet Manager automatically optimizes a battery management schedule to keep your site moving forward non-stop.

Intelligent Job Assignment

f(x) receives, organizes, and assigns tasks according to your operational strategy. Constantly monitoring and anticipating your operations, f(x) reduces wasted time and movement by using Artificial Intelligence to assign tasks for the best results.

Automatic Updates

f(x) provides automatic over-the-air updates to every AMR within your fleet to ensure your fleet is up to date with our latest improvements.

Seamless Integration

f(x) connects to your existing operational systems, such as your WMS, MES, or ERP, without any hassle. Once connected, f(x) circulates tasks across your fleet automatically and in real-time.

Smart Device Collaboration

If you have elevators or automatic doors in your facility, f(x) empowers your fleet to intelligently interact with and navigate through tricky environments. For example, f(x) allows Flex AMRs to wait for and enter elevators together.

Optimized Utility

ForwardX solutions are made to be flexible and versatile to enable you to put them to work across your facility. Based on the tasks available, f(x) will ensure that your robots contribute value wherever possible.

Customizable Dashboards

In f(x), you can customize the way you see data, prioritizing metrics most important to you. With the data constantly at your fingertips, you can create actionable plans to improve your business.

About ForwardX

ForwardX Robotics is a global leader in vision-based AMR technology, delivering innovative end-to-end material handling solutions for warehousing and manufacturing facilities. With its advanced fleet management software and the widest range of vision-first Autonomous Mobile Robots (AMRs), ForwardX Robotics helps businesses achieve higher performance and value within their supply chain operations. The company is comprised of over 250 members hailing from top universities and leading enterprises around the world. As shown by the 350+ patents and its award-winning research work, such as Frost & Sulliva's Best Practices Award and Robotics Business Review's RBR50 Innovation Award, ForwardX Robotics continues to push the boundaries of innovation.

ForwardX has deployed over 3,000 AMRs in over 220 facilities across 5 continents. With offices in the US, Japan, Korea, and China along with partnerships around the globe, ForwardX is expanding and applying its proven solutions to empower the workforce of tomorrow.

Better Performance
Better Value

Sales

oversea@forwardx.com

PR & Media

pr.us@forwardx.com

Website

www.forwardx.com

@ForwardX_US

ForwardX Robotics

ForwardX Robotics

ForwardX Robotics

www.forwardx.com