

ADDVERB

The State of AI in Warehouse Automation

Report 2026



AI

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01

Executive Summary

FROM AUTOMATED TO AUTONOMOUS:

The Era of Intelligent Material Flow

Warehouses are no longer just places of storage and movement, they're becoming intelligent hubs that self-optimize, predict and respond. With AI-enabled robotics and automation systems, digital twin simulations and real-time analytics, the modern warehouse is transforming into a strategic nerve-centre for fulfillment, agility and cost-efficiency.

For supply-chain and logistics leaders, this is a moment of opportunity. Firms that embrace AI-driven warehouse automation are unlocking not just incremental gains but step-changes in productivity and responsiveness.

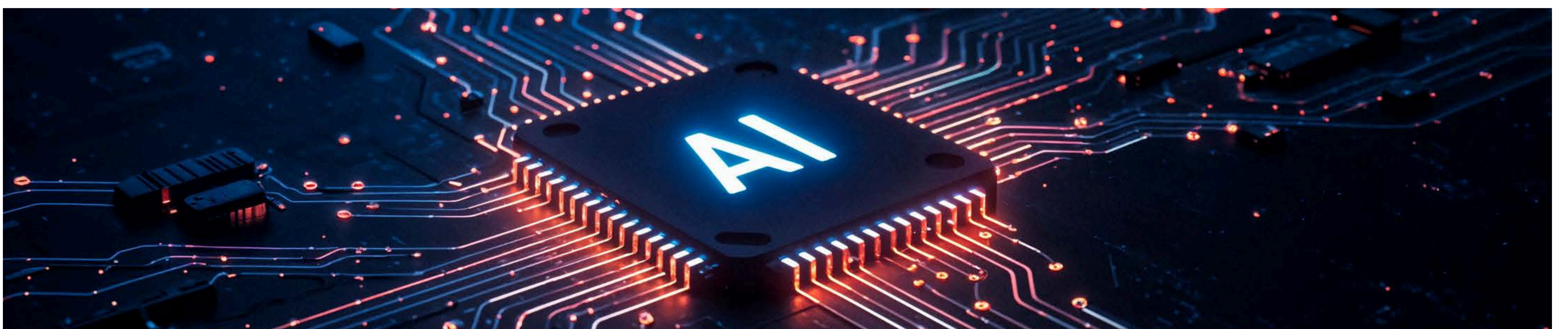
The journey from mechanised to automated to autonomous warehouses is accelerating. Today's automation is largely rule-based; tomorrow's will be predictive, self-adapting and data-driven. Capabilities like dynamic slotting with real-time inventory visibility, mobile robots with LiDAR/SLAM, digital twins for testing and modelling have matured from pilots to production with much ease due to AI.

However, just like other tech stacks, winners in these are those who can build scalable systems, not one-off experiments.

“ Embedding AI in operations can create significant value for distributors, including reductions of 20-30% in inventory, 5-20% in logistics costs, & 5-15% in procurement spend.

– McKinsey & Company

”



This whitepaper provides supply-chain and warehouse operations leaders with:

- A clear view of the current state and challenges of modern warehousing that AI can address.
- An explanation of what “AI in warehouse automation” really means, beyond buzzwords.
- A maturity-model and roadmap to guide next-gen warehouse investments.

- Concrete use-cases and data-driven benefits.
- A subtle look at how leading providers are implementing AI in this new era.

As you navigate through these pages, ask: Does my warehouse just automate tasks or is it becoming autonomous, adaptive and intelligent? If the answer leans toward the former, it’s a now or never moment for you.



02

What AI Actually Means in Warehousing

IT IS NOT JUST ABOUT AI POWERED PRODUCTS

But about AI led systems

AUTOMATION ≠ INTELLIGENCE

Automation moves goods. AI optimizes how, when and why they move. AI transforms the warehouse from “move things efficiently” to “move the right thing at the right time, with the least energy and cost.”

In a warehouse, AI exists in four layers:

LAYER	WHAT IT DOES	EXAMPLE FUNCTIONS
Perception	Understand what's happening	Computer vision, barcode/label reading, object ID, anomaly detection
Prediction	Forecast the future	Demand forecasting, replenishment prediction, maintenance prediction
Decision Intelligence	Decide optimal actions	Slotting, routing, pick-path optimisation, dynamic task assignment
Action / Execution	Execute autonomously	AMRs navigating via SLAM + LiDAR, real-time speed/power management

Addverb's autonomous mobile robots use LiDAR sensors + SLAM algorithm + on-board decision intelligence to select optimal pathways and avoid congestion in real time - without needing QR codes or any physical infrastructure on the floor.

03

Real Examples of AI in Action

AI ISN'T FUTURISTIC

It's already working, today



Dynamic Slotting & Inventory Optimization

- AI evaluates SKU velocity, affinity, and seasonality
- Classifies and repositions SKUs closest to the pick face
- Dynamic slotting + automated goods-to-person mechanism (Oracle)



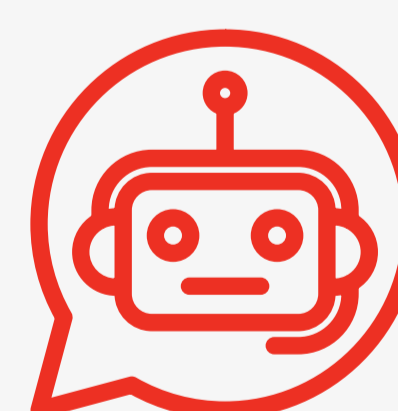
Virtual Commissioning / Digital Twin

- Test layout, routing, and control logic virtually
- Train the system before hardware goes live
- Complete virtual commissioning of the software before real deployment onsite



Replenishment & Demand Forecasting

- AI identifies patterns of order volume spikes
- Determines when to restock before stockout happens
- Optimized inventory via AI reduces stock by 20-30% (McKinsey research)



AI in After Sales Support

- Test layout, routing, and control logic virtually
- Train the system before hardware goes live
- Complete virtual commissioning of the software before real deployment onsite

3.1 AI For Inventory + Slotting + Replenishment

Traditional forecasting, based on static reorder points and moving averages - breaks down under omnichannel volatility.

AI doesn't only move goods. It decides where goods should live. Travel time is one of warehouse's largest hidden cost. AI makes slotting dynamic by optimizing bin locations to minimize total pick distance.

“ AI replaces them with multi-horizon, SKU-level forecasting that fuses sales history, lead times, promotions, seasonality, and external events to produce probabilistic demand distributions.

– McKinsey 2024

”



WITHOUT AI: Fast movers go near the pick face

- Replenishment happens when bins hit the threshold
- Results: stockouts, manual firefighting

WITH AI: Fast movers next week go near the pick face

- Replenishment happens before SKU depletion becomes critical

Techniques used by AI to predict movement

- Velocity bucketing (A/B/C classification)
- Multi-objective optimization balancing pick frequency, travel cost, and replenishment access
- Affinity analysis via market-basket or embedding models
- Online re-slotting during low-impact windows, executed by ASRS or AMRs



3.2 Digital Twin: The AI Lab For Warehouse Design

Why simulate failure in live warehouse rather than in a software?

“ Digital twin simulations reduce risk in automation decisions and accelerate ROI

– DHL

”

Addverb's digital twin enables:

- Virtual commissioning before equipment arrives
- Simulates throughput, congestion, peak order bursts
- Tests layout and WMS/WES/WCS logic virtually



What customers gain:

1. **Faster Go-Live:** Site goes operational without firefighting
2. **Higher Capacity:** Simulates SKU growth without needing facility expansion
3. **Better Decisions:** Avoids the cost of wrong automation investments

3.3 Data to Deployment bottleneck —The Addverb AI Advantage

Solving the Industry's Greatest Bottleneck: Data-to-Deployment Slowdown

Across warehousing and logistics, robotics is limited not by hardware but by the slow, fragmented pipeline required to build AI perception models.

Tasks like pallet detection, bin-picking, and pose estimation demand:

- Model optimization for edge hardware
- Massive labelled datasets
- Skilled data scientists

- Specialized MLOps expertise

The cycle takes months, making AI innovation slower and costlier.

Addverb has re-engineered this pipeline with a unified, no-code, BYOD (Bring-Your-Own-Data) AI platform that drastically accelerates development - from data collection to deployment on AMRs, ASRS systems, forklifts, and robotic cells.

The Data Factory - Smart Annotation & No-Code Training

One-Shot Annotation Using Vision-Language Models (VLMs)

The biggest bottleneck in building robotics AI is data labelling. Addverb eliminates this with Smart Annotation, a one-shot labelling engine where:

- Users label one sample
- The system auto-labels hundreds to thousands accurately
- Supports bounding boxes, semantic segmentation, oriented boxes & instance masks

No-Code Model Training

Once data is labelled, domain experts can train AI models without writing a line of code:

- Select task → choose model → click "Train"
- Training runs in the background
- Operators continue labelling next batches simultaneously

The Deployment Engine - High-Speed Real-Time Inference

One-Shot Annotation Using Vision-Language Models (VLMs)

Training a model is only half the battle. To run in production, AI must be heavily optimized. Addverb's AI Inference Server handles:

- Optimization for Nvidia TensorRT & Intel OpenVINO
- Latency reduction for real-time edge execution
- High-throughput shared serving for multiple robots

Flexible Architecture

This architecture makes scaling from one robot → hundreds trivial.

- Centralized inference server → supports entire robot fleets
- Lightweight client → runs on robot controllers & vision cells
- Deployable on robot edge computers, on-prem, or cloud

Proven Applications Delivered Through Data Factory

Addverb has already built and deployed several production-ready AI modules:

- Pallet detection
- Free space detection
- Pose estimation

- Follow-me navigation
- Bin-picking & object localization

Each of these applications moved from concept to production in a fraction of the traditional time.



The Road Ahead - Self-Improving Robotic Intelligence

Addverb's roadmap focuses on making robots that learn continuously:

Generative AI for Data Enhancement

The capabilities of generative AI help us generate non-perfect scenarios and improve functionality of existing models:

- Integrate Generative AI to "enhance" our collected data
- Create synthetic scenarios and variations (e.g., different lighting, occlusions, or product placements),
- Train models that are more robust and perform better in unknown or "edge-case" scenarios

Reinforcement Learning (RL) from Real Operations

This transforms Addverb's systems from automation to autonomous intelligence.

- Use site telemetry for self-optimization
- Robots learn best actions from experience
- Move beyond deterministic rules to adaptive decision-making



3.4 AI in After Sales Support

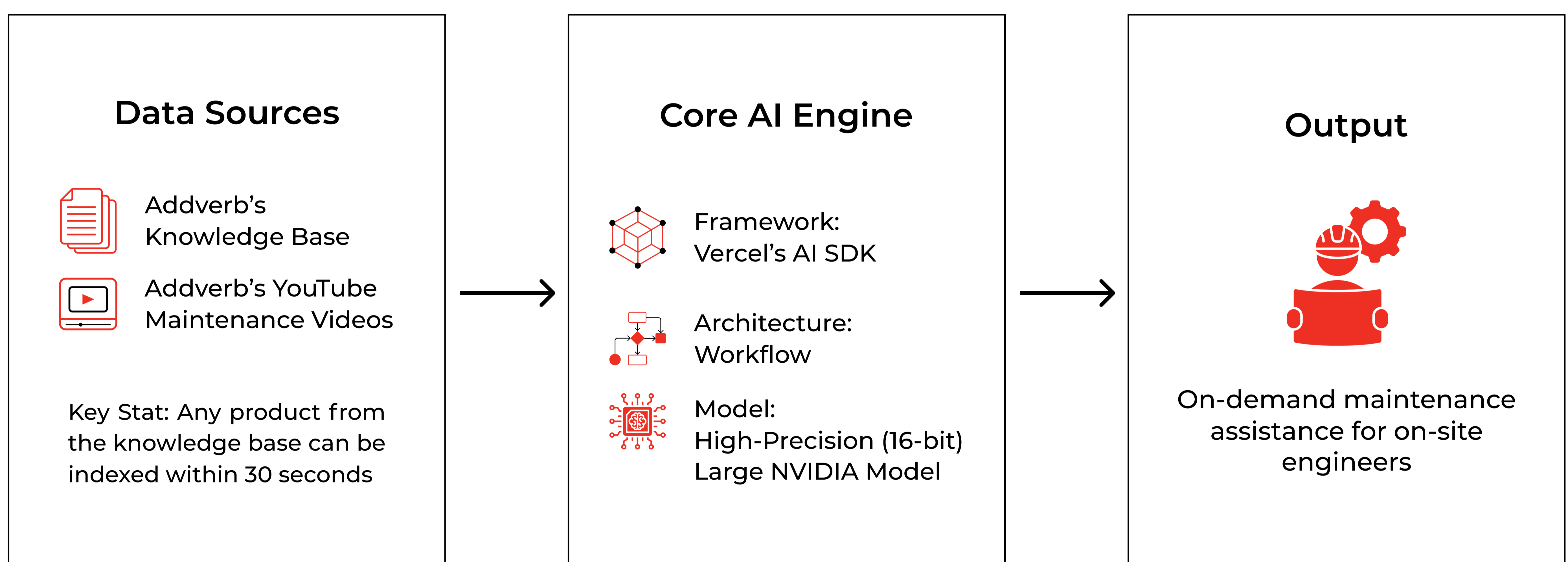
Creating an AI Assistant for Maintenance

Our after-sales and software teams are working on an objective to create an AI assistant that can provide fast, accurate answers from our extensive internal documentation. The primary challenge was the variety and complexity of source data ranging from product manuals, technical specification documents, product maintenance videos and FAQs on troubleshooting.

Upcoming Features:

- Text to speech & Speech to text for read-out results & query ingestion with trigger words
- A new module to place order for spares that auto-triggers for specific prompts
- User experience monitoring and enhancement

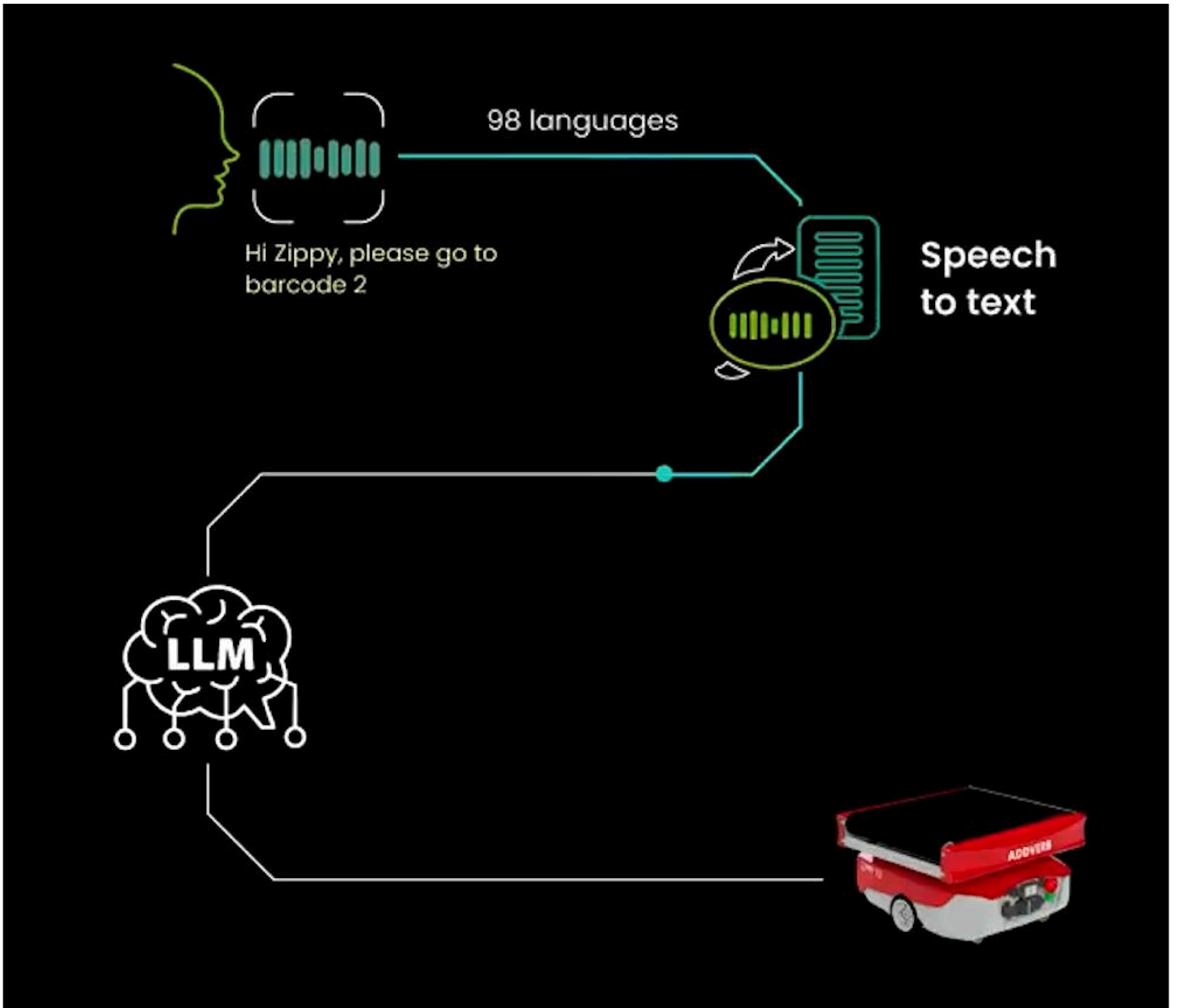
The Current Blueprint: Our AI Maintenance Assistant



AGV Control AI Assistant for Native Language Management

To help with managing the Zippy sorters, Addverb has developed an AGV maintenance with generative AI assistant based on generative AI large language models (LLM). It is an autonomous communication system for the Zippy robots to minimise downtime and increase productivity.

A warehouse worker can communicate with the model in their native language via unstructured speech. The AGV maintenance with generative AI model is smart enough to translate that speech into commands that the Zippy AGV recognises.



AI-Powered After-sales Support & Maintenance

- High Precision AI Assistant to answer specific maintenance questions
- Speech-to-text control for AGV supporting 98 languages
- Predictive Maintenance supported by inputs from Fleet Management Software

04

Addverb's Internal Process Improvements

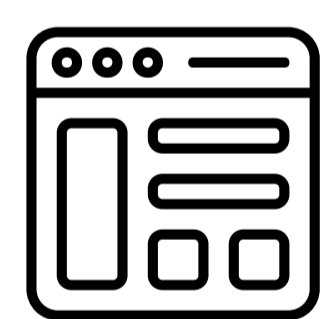
To stay ahead of the innovation curve, Addverb continues to redefine how new robots, software, and warehouse automation solutions are designed, simulated, tested, and deployed especially as global rollouts scale and enterprises

expect shorter go-live times & continuous iteration.

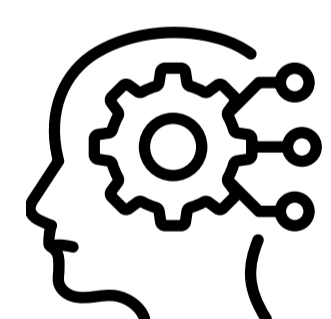
Instead of relying solely on physical prototypes or on-site testing, Addverb shifted to an AI-first, simulation-driven engineering model.

Internal AI Adoption Across Teams

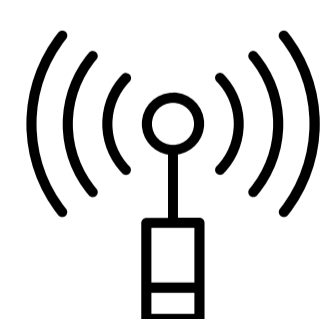
Addverb engineers now use AI actively in the product development cycle:



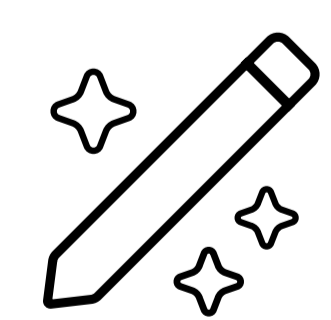
UI teams use GPT copilots and Windsurf to accelerate interface coding, layout prototyping, and bug fixing.



Controls engineers use reinforcement learning + model predictive control (MPC) to avoid hours of manual tuning.



Perception teams run AI-powered sensor fusion + odometry correction to reduce drift in AMRs and quadrupeds.



Mechanical design teams use AI-driven generative design + additive manufacturing to build lighter robotic arms and linkages.



Testing and QA teams use digital twins to stress-test AMR fleets and warehouse layouts before deployment.

All of this results in spending **less time fixing, more time inventing.**

Outcome & Measurable Impact

FEATURE	RESULT
Cloud simulation and virtual commissioning	Testing time ↓ From 3–4 hours → 10–15 minutes/day
AI-assisted development & simulation workflows	Development cycle ↓ From 3–6 months → 2–3 months
Reinforcement learning + MPC tuning	Near-zero manual tuning hours required
AI-driven generative design	Reduced redesign loops; faster prototype-to-production

Why This Matters to Customers

Because Addverb can test, validate, and deploy faster:

- Warehouse rollouts are lower-risk and more predictable
- Robots learn and adapt before deployment
- Customers get faster implementations for greenfield & brownfield projects.



05

Concluding

The future warehouse doesn't just move, it thinks.

A decade ago, warehouse automation meant putting conveyors and machines where people once walked.

Today, automation is no longer enough. The most advanced supply chains in the world are shifting to a radically different model — one where the warehouse learns, adapts, predicts, and continuously improves.

AI is the operating system of the autonomous warehouse.

- It powers how robots see, decide, evolve, move inventory, and scale.
- It enables digital twins that simulate peak loads before they occur.
- It delivers predictive slotting intelligence for future-ready SKU placement.

Warehouses that embrace AI are discovering an uncomfortable truth:

Labor efficiency has a ceiling. Intelligence does not.

Addverb builds self-improving warehouse ecosystems:

- AMRs with real-time routing
- Sorting robots with AI decisioning
- AS/RS with slotting and replenishment forecasting
- Digital twin for continuous simulation and improvement
- Fleet management intelligence that turns movement into strategy

We have been in the field implementing this at scale — not in labs, but in live operations.

Glossary

The business meaning of concepts of AI in Warehousing

WHAT WILL IMPROVE	WHAT IT IS NOW	HOW WILL IT BENEFIT YOUR WAREHOUSE
SLAM (Simultaneous Localization & Mapping)	Robot creates its own map and figures out where it is within that map	No floor tapes/markers needed, flexible layouts
LiDAR Navigation	Laser scanning to understand obstacles & space	Safe, high-speed movement even in dynamic operations
Fleet Management System (FMS)	Technically the software, metaphorically the brain that allocates tasks to robots	Balances workload across hundreds of robots in the fleet
Digital Twin	A virtual replica of the warehouse with its automation systems	Test every single piece of the automation system without touching the real floor
Reinforcement Learning (RL)	AI learns by trial-and-error in simulation	Better routing decisions with every cycle
Predictive Maintenance	Predicts failures before they happen	Fewer breakdowns, longer equipment life
Slotting Optimization	Decides where SKUs should live	Fast picks and fulfilment, shorter robot/human travel time
Demand Forecasting AI	Predicts what inventory is needed and when	Higher order-fill rates, lower working capital

“

AI won't
replace
humans.

But humans who use AI
will replace those who don't.

- Sam Altman

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