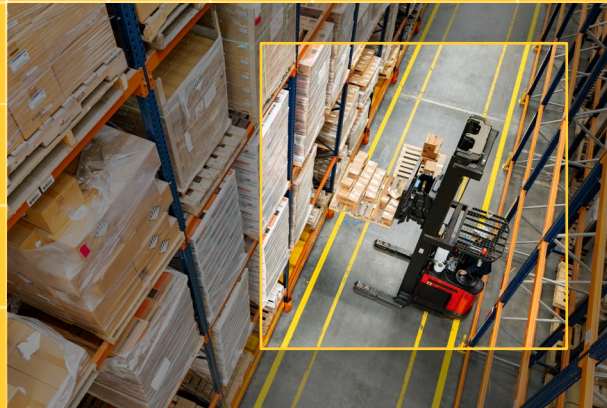


Warehouse Intelligence

Transforming Operations and Safety with Computer Vision, Audio, and Sensors

A practical guide with real-world use cases and customer stories



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Executive Summary

From Visibility to Competitive Advantage

Warehouses today face pressure to increase throughput while managing challenges related to labor, safety, and sustainability. Most industry leaders recognize the value that machine vision can bring to their operations, but many still lack clarity on where to start.

This report demonstrates a fundamental shift in perspective: **cameras are no longer passive security tools**, they are active sensors at the core of an intelligent operational network. By integrating IP cameras with advanced analytics, audio, and radar on the edge, warehouses are unlocking a continuous stream of real-time, actionable data.

This intelligence-driven approach delivers concrete benefits, specifically **transforming Operations and Health & Safety within the warehouse**. Logistics leaders can achieve faster throughput, lower costs, and ultimately, smarter, data-powered decision-making.

This report delves **into the strategies and technologies driving this transformation**, exploring a comprehensive range of insights and applications, illustrated by two real-world examples.



The New Reality of Logistics Operations

Compounding PRESSURES

Fulfillment
expectations
are rising

Increasing
safety
incidents
& liability

Persistent
labor
shortages

Sustainability
& CO₂
reduction
targets

Margin
pressure from
inefficiencies
& claims

Today's warehouses are caught between two powerful, opposing forces. On one side, market expectations for near-instant fulfillment. On the other, a strained and volatile workforce struggling to keep pace. This inevitably results in costly manual errors and disruptive safety accidents, all while the mandate to reduce CO₂ emissions grows more urgent. In response, a clear consensus is emerging: leaders are turning to technology for a strategic advantage.



65%

of warehouse leaders plan to adopt **machine vision by 2030** – yet more than half don't know where to begin¹.

This statistic reveals a fundamental truth: leaders know they need more "eyes", but the path from ambition to action is unclear. The key is to avoid trying to solve everything at once. Our advice is simple: start with **quick wins**. Focus on challenges that have **low-complexity, high-impact** solutions. This approach creates a practical, scalable roadmap.

It's a journey that starts with simply gaining **better visibility into your operations** to see what's truly happening. From there, you progress to automatically detecting and responding to specific events. Ultimately, this allows you to integrate systems, automate actions, and use the wealth of new data to make smarter, predictive decisions.

¹Source: Zebra Technologies, Warehouse Vision Study, 2024





Cameras as Sensors

The New Potential of Cameras

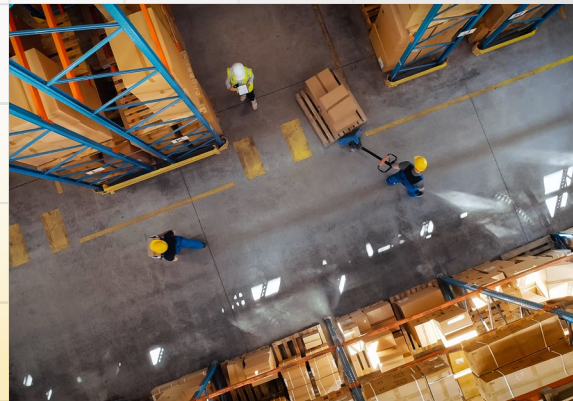
Traditionally, cameras pointed OUT, securing the perimeter. Today, they point IN, giving warehouses vital operational and safety insights. **Cameras now see, understand, and act before problems arise.**

This shift is possible thanks to dedicated powerful AI chips running analytics directly on the camera to generate instant insights and trigger real-time actions.

Instead of reviewing hours of footage or waiting for human action, you get immediate alerts. Instead of separate systems, you get seamless integration with audio, visual alerts, and other machinery. And because processing happens on the device, privacy and cybersecurity are built in by design.

So, are you IN or OUT?

INSIDE



OUTSIDE





Safer Warehouses

Preventing Incidents Before They Escalate

Warehouses and logistics centers operate in inherently high-risk environments where vehicle movement, heavy machinery and human interaction intersect daily. The primary health and safety risks are related to **fatigue-related incidents**, with tired workers 70% more likely to make errors that lead to serious accidents². **Fires and equipment overheating** further increase operational exposure. In addition, **machinery-related incidents** remain a major concern, with forklifts alone accounting for 25% of workplace transport accidents².

Addressing these risks requires more than reactive reporting; it demands proactive visibility, real-time detection and automated response. By combining video analytics, thermal imaging, radar, audio systems and environmental sensors, safety risks can be identified early, mitigated immediately and analysed systematically over time.



70%

higher likelihood that tired workers make errors leading to serious accidents.



25%

of workplace transport accidents are caused by forklifts alone.



²Source: Spacebands.com, Top 10 Health & Safety Risks in Logistics, 2025



Safer Warehouses

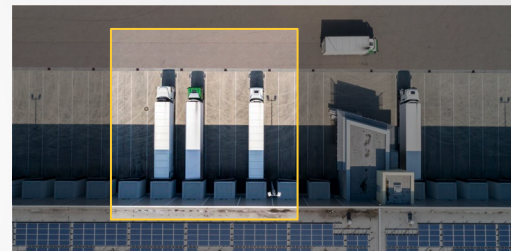
Reducing fatigue-related and operational incidents



Advanced computer vision systems **ensure PPE compliance and identify slip-and-fall incidents** through continuous monitoring, while IP audio systems deliver instant alerts when incidents are detected and enable **real-time fatigue mitigation** with automated break prompts.



Radars **detect speeding trucks and forklifts**, while onboard cameras on vehicles assist with investigation and insurance claims. Advanced setups add **driver alerts**, strobe sirens and **near-miss detection**.

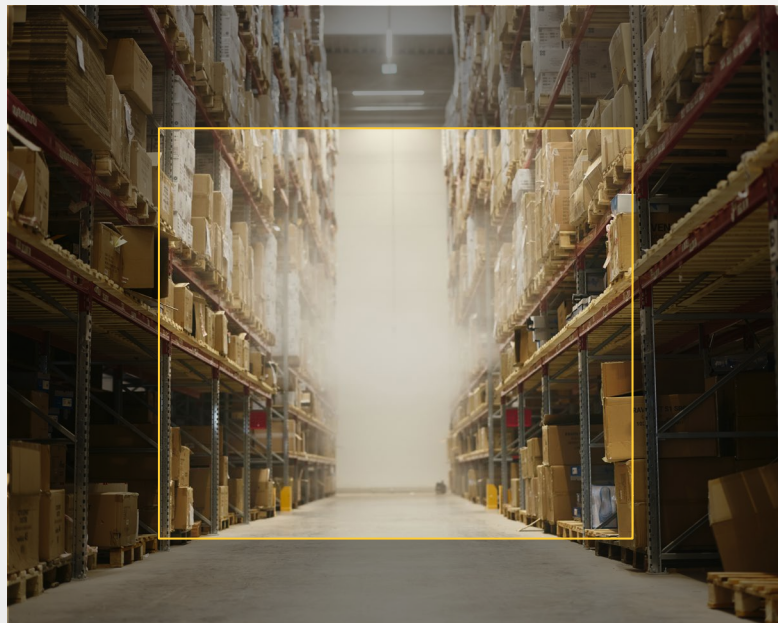
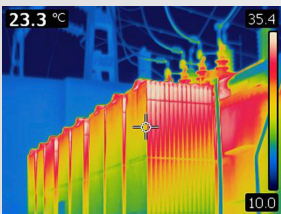
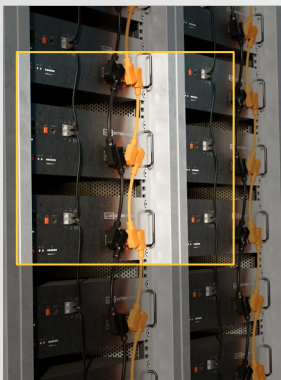


Cameras provide **inside and outside loading dock visibility** to monitor truck parking and anchoring, goods handling and stacking, and confirm when it's safe to open the gate while connected horns, strobes and displays alert staff.



Safer Warehouses

Early Smoke and Fire Detection



One of the most common causes for fires is **electrical equipment**. **Thermal monitoring** enables continuous assessment of equipment conditions, helping **detect anomalies before overheating occurs**.

Visual cameras also provide **early smoke detection** that surpasses the capabilities of traditional sensors. This is much faster than traditional smoke detectors, especially in outdoor areas and indoor areas with high ceilings.



Other video use cases that warehouses have been deploying to support health & safety initiatives:



Zone specific audio



Air quality and noise monitoring

Triggered audio/light signalling



Search video by description



Blocked emergency exit detection



Track accidents and safety trends





“Axis cameras serve our business needs, including the implementation of our sustainability strategy, with high reliability, no failures, optimal use of resources, high energy efficiency and long-term reliability, as guaranteed by the vendor.”

Dr. Gergő Soltész
Compliance & HSSE Director
at DPD Hungary, Ltd



Your delivery experts

Improving HSE Through Better Process Visibility

At its Budapest distribution hub, DPD Hungary uses multisensor IP cameras to monitor logistics processes and strengthen safety.

The cameras send an alarm when a line is crossed or in the event of strong vibrations, thus helping to ensure compliance with occupational safety rules.

[Read the full case](#)



Operational Efficiency

Turning Hidden Losses into Measurable Gains

Warehouse operations face significant and often underestimated financial pressures. **Truck delays and detention** alone cost the US trucking industry over \$15 billion in 2023³. Beyond these headline figures, **operational inefficiencies**, from packing errors and conveyor downtime to wasted fuel, can cost individual facilities up to \$1 million per year. And when incidents occur, **lack of video evidence** forces teams to rely on security footage that was never designed to capture operational events, leaving gaps in evidence, accountability, and process improvement.

Addressing these challenges requires more than process optimization. It demands continuous operational visibility, real-time verification, and intelligent automation. By combining video analytics, access control, radar, and audio systems, operational bottlenecks are identified early, losses reduced, and efficiency gains measured systematically over time.



> \$15_B

costs of truck delays and detention
in US trucking in 2023.



~ \$1_{M/year}

operational inefficiencies can
cost to individual facilities.



³Source: Trucknews.com, Truckdriver Detention Costs, 2024



Operational Efficiency

Driving Throughput and Operational Efficiency



Truck delays start at the gate. Vehicles are automatically identified and verified on arrival with license plate recognition cameras, eliminating manual check-ins. Meanwhile, cameras at high vantage points detect forming truck queues, and analytics at loading docks monitor availability in real-time.

These are powerful quick wins, but the real transformation happens when these devices connect to existing systems like a **Yard Management System**. An arriving truck is automatically verified against the schedule, the gate opens and the driver is routed to a free dock with minimal human intervention.

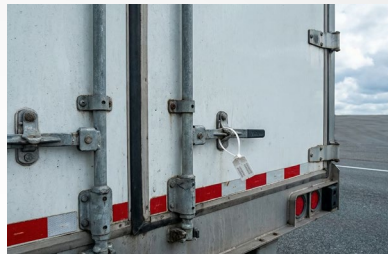
The result: faster dock assignments, dramatically reduced dwell times, and a smoother flow from gate to dock.



Other video use cases that warehouses have been deploying to achieve efficiency gains:



Conveyor flow and jam monitoring



Load integrity and tamper verification

Capture container & transport codes



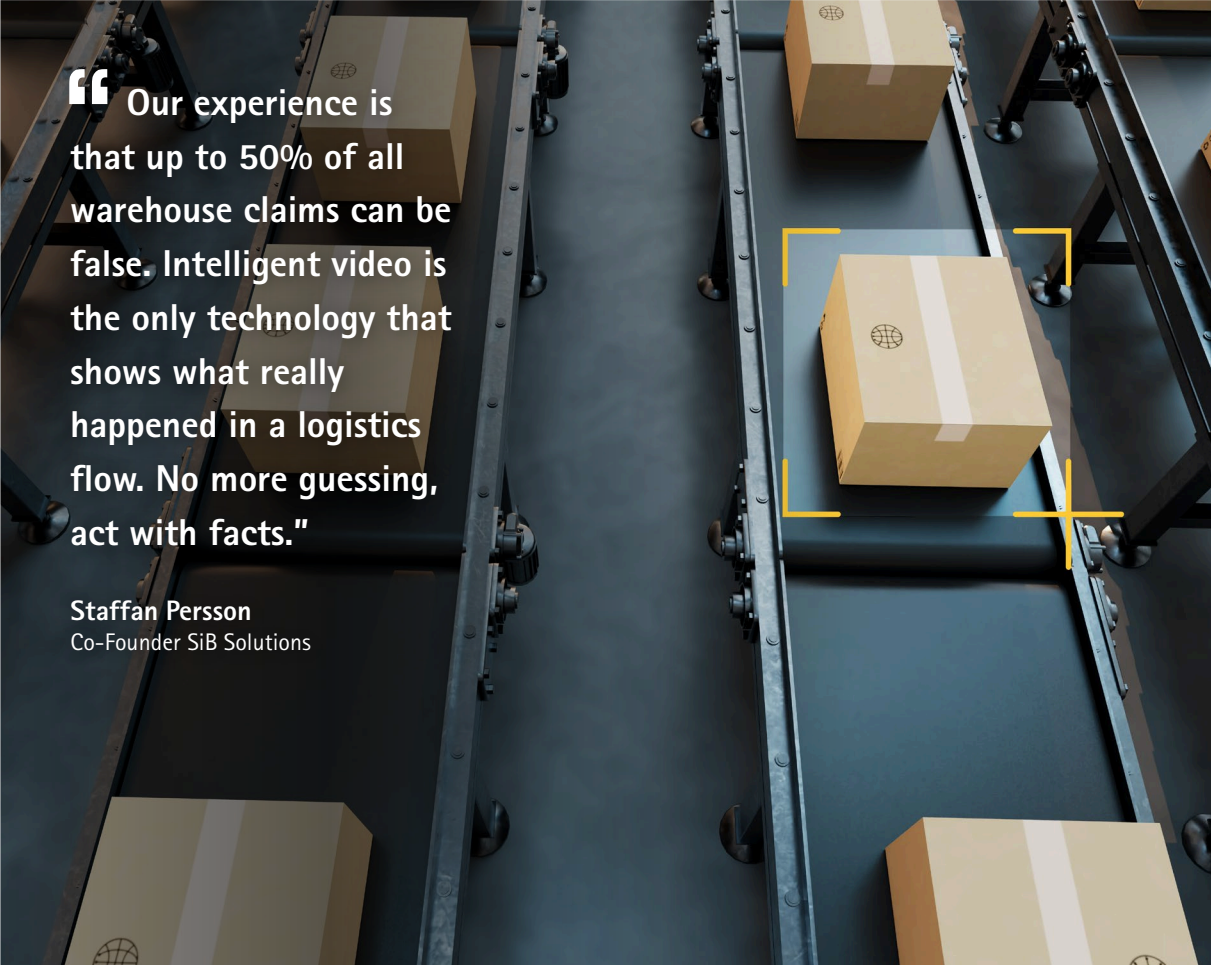
Overlay machine & sensor data



EV charging monitoring



Video proof of packing to reduce false claims



“Our experience is that up to 50% of all warehouse claims can be false. Intelligent video is the only technology that shows what really happened in a logistics flow. No more guessing, act with facts.”

Staffan Persson
Co-Founder SiB Solutions

Reducing Errors and Transport Costs with Intelligent Video

Integrating video with existing data transforms video analysis into a powerful time machine, revealing exactly what happened, when, and why. Benefits:

- Root cause analysis in seconds
- Reduced errors, fewer false disputes, and lower transport and administration costs
- Improved delivery accuracy, quality, productivity, and customer satisfaction

Learn how these organizations benefited from intelligent video:

Scania

Postnord

Meko/BCP



Becoming More Sustainable

Video Makes Inefficiencies Visible



Sustainability in logistics isn't just about green initiatives: it starts with eliminating waste that's already there. **Trucks idling in queues** burn fuel unnecessarily. Vehicles dispatched **half-empty double the trips** needed. False claims without video evidence trigger **avoidable returns and reshipments**, wasting fuel, packaging, and materials.

Environmental sensors add another layer, continuously monitoring temperature and humidity across storage areas to **prevent goods from spoiling** before they ever leave the facility. Even something as simple as a dock door left open can go unnoticed for far too long, wasting considerable energy; video analytics detect this immediately.

Combining video analytics, radar, and environmental sensors, warehouses directly reduce their carbon footprint and material waste, not through additional investment, but by optimizing what they already do.



Cybersecurity and Privacy

Designed In, Not Added On

Deploying cameras in a workplace raises two legitimate concerns: **worker privacy and cybersecurity**. We address both by design.

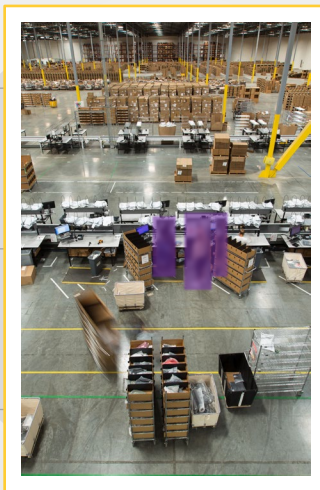
WORKER PRIVACY

Privacy by design: Video is analyzed directly on the camera — the only data that leaves the device is the result, not the footage. When video does need to be shared, workers can be automatically anonymized. And technologies like thermal cameras and radar cannot identify individuals at all. These measures ensure compliance with GDPR and other privacy regulations while still delivering full operational and safety insights.

Edge analytics
and encrypted
edge recording

Real-time
worker privacy
masking

Radar and
thermal imaging
(non-identifying
sensors)



Secure
device
architecture

Regular
firmware
updates

Compliance with
global standards
(GDPR, CER, NIS2,
ISO/IEC 27, etc.)

CYBER-RESILIENT INFRASTRUCTURE

Secure by default: Every Axis device is built with robust cybersecurity measures in hardware and software. Regular firmware updates protect against emerging vulnerabilities, and our products align with recognized global cybersecurity standards — enabling you to enforce the regulations specific to your jurisdiction and organization.



Vendor Selection Scorecard

Avoiding pitfalls when selecting a vendor

Consider the following factors when selecting a video solutions provider to ensure a secure solution and manageable costs.

Worker Privacy by Design

Protect people while enabling performance.

- ☐ Real-time worker privacy masking
- ☐ Radar and thermal imaging (non-identifying sensors)
- ☐ Edge analytics and encrypted edge recording

Cyber-Resilient Architecture

Minimize cyber risk and operational disruption.

- ☐ Secure device architecture
- ☐ Regular firmware updates
- ☐ Compliance with global standards (GDPR, CER, NIS2, ISO/IEC 27, etc.)

Openness & Interoperability

Prevent vendor lock-in and reduce integration costs.

- ☐ Commitment to open standards
- ☐ Broad third-party compatibility
- ☐ Open APIs and application platforms

Global support

Delivery and support anywhere you operate.

- ☐ Ecosystem of system integrators and technology partners
- ☐ Proven ability to support multi-country, multi-site environments
- ☐ Global technical support and local implementation expertise

Responsible Resource Management

Advance sustainability targets.

- ☐ Energy-efficient design and responsible material use
- ☐ Circular product strategy and extended lifecycles
- ☐ Global repair support and long-term software availability



Your needs are specific – our offering is vast. Get in touch so we can figure it out together.



Connect with an Axis specialist in your region to explore relevant use cases. Or **visit** one of our **Axis Experience Centers**.

[Contact us here](#)



Learn more about **Axis Communications and logistics**.

[More information](#)

About Axis

Axis enables a smarter and safer world by improving security, safety, operational efficiency, and business intelligence. As a network technology company and industry leader, Axis offers video surveillance, access control, intercoms, and audio solutions. These are enhanced by intelligent analytics applications and supported by high-quality training.

Axis has around 5,000 dedicated employees in over 50 countries and collaborates with technology and system integration partners worldwide to deliver customer solutions. Axis was founded in 1984, and the headquarters are in Lund, Sweden