

Industrial Internet of Things

Solution Brief

IoT Data Powers Smart Industrial Manufacturing

IoT sensors and monitoring devices on industrial equipment are ushering in a new era for smart manufacturing, oil and gas, and transportation and logistics. Yet IoT devices are only as good as their resultant data that can be leveraged to mitigate equipment malfunctions, predict and assess material arrivals, and optimize manufacturing and processing flows.

The rise of IoT is ushering in a new era for smart manufacturing. Today's Industry 4.0 manufacturing ecosystems are heavily data-driven, as companies are looking to leverage IoT sensors and monitoring devices to measure and analyze vast amounts of streaming data in real-time.

For companies to succeed in the new Industry 4.0 environment, they will be required to **transform** their existing IT architecture and operations to **optimize** the data that industrial IoT sensors bring to bear.

Key Industrial IoT Use Cases¹

Industrial manufacturing is the granddaddy of all IoT-based use cases, with spending anticipated to reach \$110 billion by 2025.²

Production Monitoring (61.6%)

Inventory Monitoring and Management (51.4%)

Predictive and Condition-Based Maintenance (44.2%)

Intelligent Logistics (36.2%)

Connected Worker (26.8%)

Fleet Tracking (24.6%)

¹ [Industrial IoT - market size worldwide 2017-2025](#)

² Percentage of companies implemented in 2020;

Aerospike – the Core of IIoT Infrastructure

The data platform sits at the heart of industrial IoT infrastructure. Aerospike's flexible architecture can be adapted to any edge network, helping drive large scale IoT adoption, shorten the learning curve for manufacturing and logistics teams, and derive business benefits more quickly. The platform scales without losing performance, so you can easily add new devices from the factory floor to warehouses and distribution points, and change requirements at will.

The success of intelligent manufacturing hinges on the effective deployment of a wide range of technologies, including IoT sensors, real-time edge data processing, rapid 5G connectivity, core and cloud data architectures, AI and machine learning engines, and intelligent analytical tools such as digital twins to optimize equipment and workflows.

Aerospike powers the entire industrial IoT lifecycle:

Factory Automation & Production

Digital Twins

Predictive Maintenance

Asset Tracking, Inventory
and Warehousing

Transportation and Logistics

Implementation in Key Industries
Such as Oil and Gas

Key Technical Specifications & Benefits

Low Latency

Sub-millisecond responsiveness at 95th percentile

Performance at Any Scale

Reliably handles millions of transactions per second while efficiently scaling to meet petabyte-range data volume needs

High Availability

Demonstrated uptime of five 9s, enabled by dynamic cluster management, Smart Client, and local and remote replication

Data Consistency

Multi-site clustering supports strong immediate data consistency, multiple locations and automated failovers without loss of data

Global Data Hub

Route data captured at the edge to where it is needed to meet compliance requirements

Low TCO

Patented flash-optimized storage architecture with dynamic cluster management fuel a 40-60% lower TCO over in-memory NoSQL databases.

Integrations & Connectivity

Apache Spark™, Kafka, Pulsar, Presto and JMS™ to deploy modern data architectures for real-time, mission-critical apps

5G Architecture

Onboard database with SSD storage, sync edge datacenters via XDR, with models and decisioning onboard or at the edge

Enterprise Security

Data Encryption (in-motion, at rest), authentication, authorization, auditing, access control, whitelisting, Hashicorp integration.

Smart Factory Automation & Production

Today's smart factories are increasingly dependent on IoT devices and edge processing to optimize production and reduce waste. IoT makes it possible to connect machines' equipment to each other, to plant managers and to operations engineers – as well as connecting locations and factories to each other. Aerospike's AI and machine learning frameworks help simplify the routing, processing and analysis of key production data, enabling automatic delivery of insights from large volumes of rapidly changing data points and empowering more intelligent automation. The powerful architecture gives you greater visibility into operational performance, usage patterns, downtime, expenditures, and frequently used or unused equipment features.



Key Capabilities and Benefits

- Monitor industrial equipment, synchronize operations seamlessly within production lines and give a unified view of equipment and operations across multiple factories.
- Quickly analyze video-camera coverage to spot production problems and bottlenecks, identify defective equipment and improve worker safety conditions.
- Leverage AI and machine learning to build factories that are able to learn from vast amounts of analytical data and self-correct on-the-fly.
- Optimize production capacity and planning by getting the fastest and most accurate look at real-time warehouse and factory inventory levels.

Digital Twins & IoT

Digital twins are virtual facsimiles of physical machinery and equipment that product designers use to monitor real-world production scenarios and make product improvements as new products are created. Industrial IoT sensors provide the real-world feedback that can be shared with the digital twin to uncover usage,

reliability and performance metrics that enhance future iterations of the industrial design. Once IoT sensor data is aggregated at the edge, it can be fed into Aerospike's AI and machine learning engines to optimize insights for the digital twin and enable predictive planning, design, production and maintenance.

Use Cases and Benefits

- Simplify and streamline prototype and Proof of Concept (POC) lifecycles so that product enhancements (based on physical-world IoT data) can be implemented early.
- Analyze data from individual machines to fleets of products to evaluate their aggregate impact on shop floors and entire factories.
- Deliver event-driven analysis of equipment performance to predict and mitigate component failures.
- Create products that reduce the need for maintenance and reduce shop floor equipment downtime.
- Improve product lifecycle visibility, change management processes and time to market.



Predictive Maintenance

Even the best manufacturing equipment can break down, but IoT sensor data analyzed in real-time can proactively identify maintenance issues, diagnose failures and enable production teams to deploy fast solutions and remedies. Aerospike empowers rapid IoT-driven predictive maintenance capabilities that can help reduce equipment downtime and extend asset life. Predictive maintenance can help companies achieve an increase of 20-40 percent in equipment life and 20-25 percent increase in overall equipment effectiveness.



Use Cases and Benefits

- Monitor and ensure the physical integrity, operational efficiency and real-time asset health of industrial machines & equipment.
- Quickly identify anomalous mechanical readings such as temperature, gear speed or vibrations that exceed specific thresholds.
- Ensure industrial machine and equipment efficiency and proactively identify problems and maintenance needs.
- Reduce the need for excessive equipment upkeep, optimize maintenance schedules and improve asset utilization.

Asset Tracking, Inventory & Warehousing

IoT plays a critical role in today's modern warehousing and inventory activities, helping companies track vital assets such as parts and supplies with better accuracy and act on replenishment needs much faster. Smart warehouses provide superior visibility and predictability to supply chain planning as they connect product lines, component inventory levels, storage capacity, expected deliveries and material distribution. Inventory workers also get a big boost in productivity and safety as they utilize advanced IoT technologies on the job.



Use Cases and Benefits

- Optimize production capacity, planning and working capital by getting the fastest and most accurate look at real-time warehouse and factory inventory levels.
- Speed warehouse order picking and ensure item accuracy via mobile devices, VR headsets and other IoT devices.
- Improve manufacturing safety with wearables and environmental sensors to identify potentially dangerous situations.
- Enhance warehouse staffing and retention by making inventory management a more automated, technology-driven activity.

Transportation and Logistics

The faster you can process the status of every aspect of your transport and shipping assets, the faster you can identify and fix problems and keep your fleets delivering goods optimally. Aerospike delivers more accurate IoT data to help reduce the cost of shipping operations, optimize transportation routes and schedules, provide better visibility of goods in transit, and mitigate risk for employees and cargo. Shipping IoT can reduce damaged goods by up to 50%, increase container utilization by up to 25%, and lower ship navigation time by up to 13%.



Use Cases and Benefits

- Monitor supply chain delivery schedules, anticipate delays and understand developing problems to reroute and reschedule with better accuracy.
- Track progress of vehicles, trucks, fleets, containers and other assets to accurately predict and revise delivery times.
- Improve accuracy of analysis for container IoT data, such as location, temperature, shocks and lighting.
- Conduct predictive maintenance, diagnostics, and fuel consumption analysis for vehicles and transportation assets.

Industry Use Case: Oil and Gas

Industrial IoT is changing the future of the oil and gas sector, which has traditionally used older, inefficient means of monitoring and collecting data. The industry will need to change its approach to every aspect of its business by leveraging IoT technology and faster data analysis. Sensors are cost-effective assets to improve data analysis at every point in the oil and gas lifecycle, from exploration and production to pipelines, storage, refineries and retail. Faster analysis of IoT sensors helps optimize production and reduce the time it takes to troubleshoot problems from days to just minutes.



Use Cases and Benefits

- Automate and monitor smart sensors on thousands of wells and pumps to accurately forecast equipment failure and improve condition-based maintenance.
- Build a data-enabled infrastructure to leverage geolocation data, weather data and log data to improve transportation, pipelines and storage.
- Monitor refinery production equipment to identify lost energy, or top performance to establish best practices.
- Generate new revenue streams with IoT-enabled digital consumer marketing.
- Improve visibility to measure and mitigate risk across the supply chain.

About Aerospike

Aerospike is the global leader in next-generation, real-time NoSQL data solutions for any scale. Aerospike enterprises overcome seemingly impossible data bottlenecks to compete and win with a fraction of the infrastructure complexity and cost of legacy NoSQL databases. Aerospike's patented Hybrid Memory Architecture™ delivers an unbreakable competitive advantage by unlocking the full potential of modern hardware, delivering previously unimaginable value from vast amounts of data at the edge, to the core and in the cloud. Aerospike empowers customers to instantly fight fraud; dramatically increase shopping cart size; deploy global digital payment networks; and deliver instant, one-to-one personalization for millions of customers. Aerospike customers include Airtel, European Central Bank, Experian, Nielsen, PayPal, Snap, Verizon Media and Wayfair. The company is headquartered in Mountain View, Calif., with additional locations in London; Bengaluru, India; and Tel Aviv, Israel.

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