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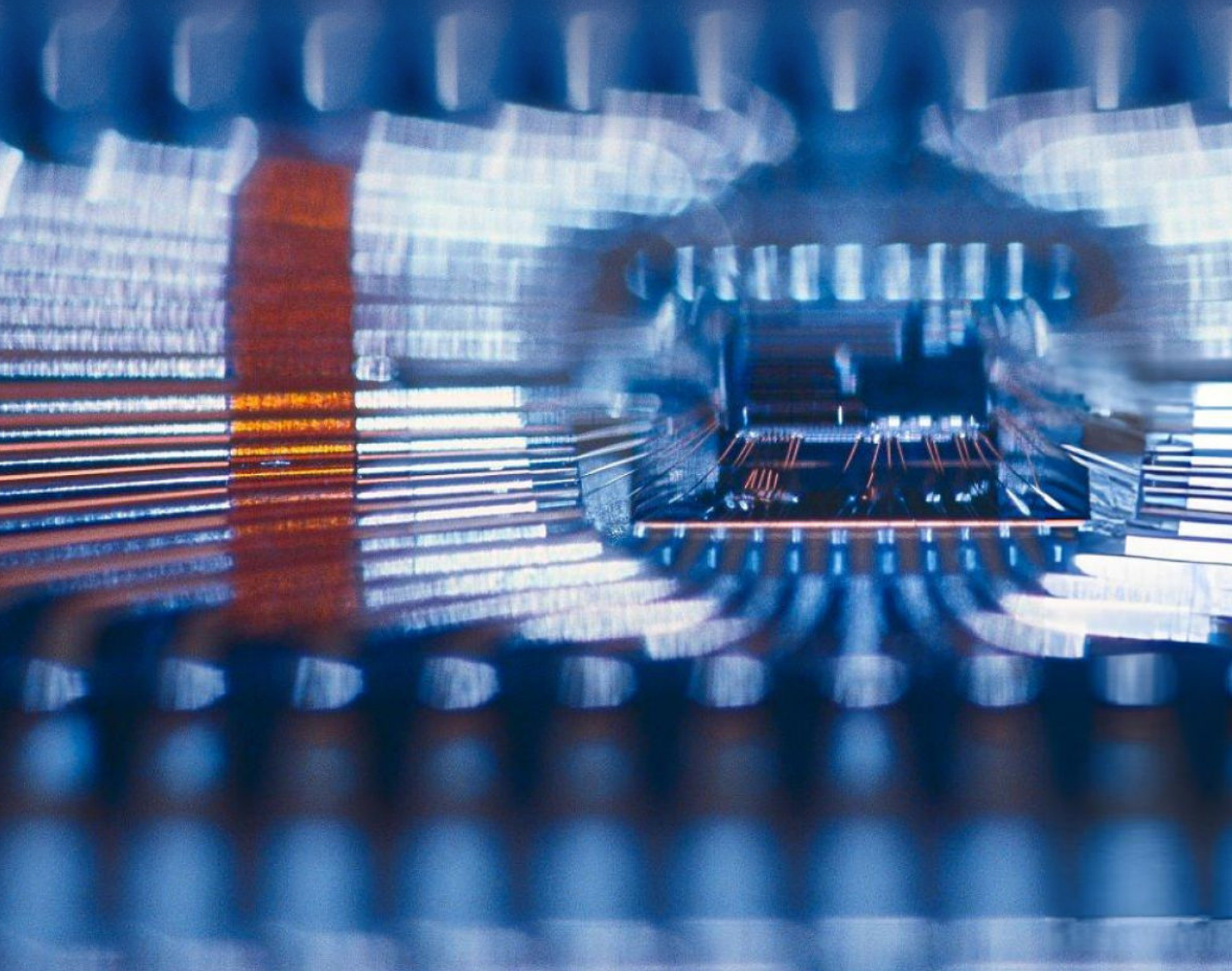
SOLUTION GUIDE

Addressing Manufacturing's Toughest Data Challenges: Proven Strategies for Every Stage in the Manufacturing Process

How data plays a pivotal role in ensuring success in manufacturing.



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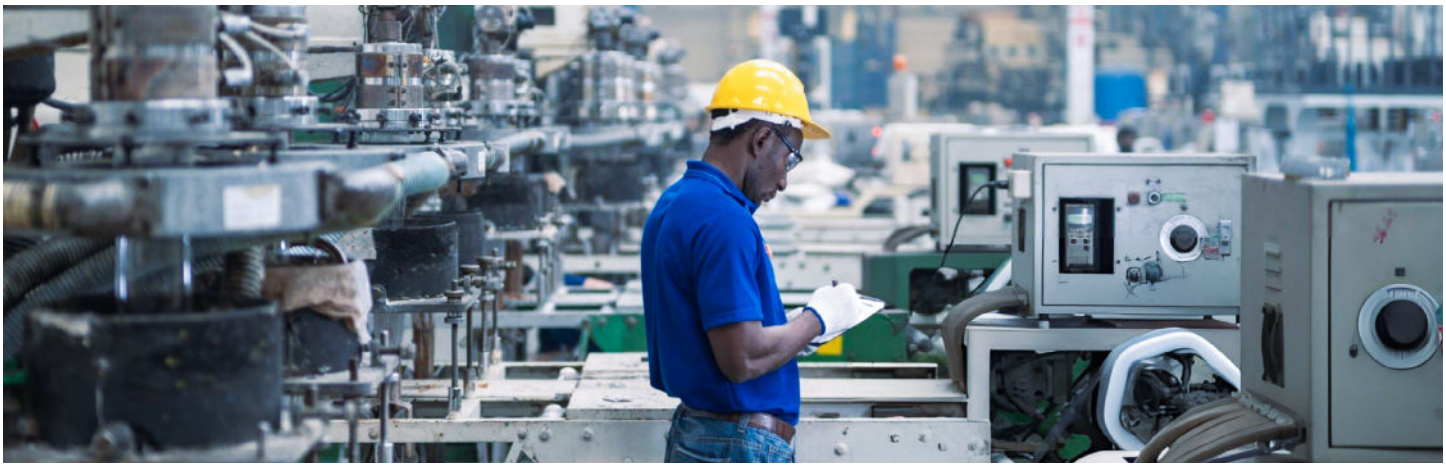

Imagine, if you will, that you've been tasked with building a house. You have a pile of materials, but no blueprint. You have no way of knowing if you have the inventory to pull off the build, and you have no way of knowing where to even start. With no plan, the construction would be disorganized and inefficient. That's what managing modern manufacturing operations is like with siloed, poor-quality data.

Margins are getting smaller, and competition is at an all-time high. The average manufacturer is pulling data from more than 400 sources. When this happens in silos or using disconnected processes, it reduces operational efficiency and cuts into your competitive edge. From skyrocketing operational costs to the wild unpredictability of global supply chains, the pressure is on to tighten up your operations and cut out waste, but inefficiencies have a way of sneaking onto the production line.

Then there are supply chain disruptions. Global health crises, trade disputes, geopolitical disruptions, infrastructure catastrophes—you name it, they've shown how quickly things can get tangled up, causing delays and huge headaches in getting materials where they need to go. In fact, 64% of surveyed manufacturing leaders named supply chain disruptions as one of their top three challenges of 2023.[1] These snags can throw a wrench into the whole production process, messing up deliveries and turning inventory management into a real nightmare.

On the tech side, the leap towards digital transformation is packed with potential to make things more efficient and save money. But the reality is that many manufacturers are finding it tough to blend new tech—like the Internet of Things (IoT), Artificial Intelligence (AI), and robotics, with their older systems. This challenge, however daunting, needs to be addressed.

While a massive 64% of consumers wish companies would respond faster to meet their changing needs, 88% of executives feel their customers are changing faster than their business can keep up.

In this maze of complexity, getting a grip on how data moves and is used in every manufacturing stage—from research and development (R&D) to production planning and shipping—is critical. Every step reaps massive benefits by having data in one place with easy accessibility, and a scalable and secure data platform is key to doing just that. By streamlining operations and enabling a sustainable competitive advantage, a data platform can help tackle these challenges head-on by providing a clear, accurate, and current view of your supply and demand as well as insights into all phases of your manufacturing business. With this kind of platform, you can tap into real-time insights that boost efficiency and slash costs by pinpointing areas for improvement, inefficiencies, and missed opportunities.

This full-circle approach doesn't just build resilience; it also amps up your ability to adapt in a fast-evolving global market, stay ahead of changing customer needs, and improve forecasting to align supply with demand.

1 https://www.alithya.com/en | https://info.alithya.com/hubfs/Mary%20Haughey/Alithya%20Manufacturing%20Survey%202023%20-%203.3.23.pdf

Accelerate and Inform Research and Development

Data is a fundamental asset that has the potential to drive innovation and product improvement during the R&D phase of manufacturing. The presence of bad or inaccurate data, however, can severely hinder productivity and lead to misinformed decisions, wasted resources, and the development of products that fail to meet market needs or safety standards. The challenge here often lies not just in collecting the data, but in ensuring its accuracy, relevance, timeliness, and quality.

It's common for manufacturers to face significant hurdles in the R&D phase, often due to the reluctance to modernize existing systems. This reluctance may stem from concerns about costs, complexity, and perceived disruption that new technology might bring. Existing systems might use outdated formats or protocols that are seemingly incompatible with newer technologies, leading to fragmented or siloed data environments. These challenges prevent a unified view of data, which is critical for effective R&D.

Using data is hard, primarily due to the diverse sources and types of data that must be managed. R&D teams might need to integrate data from legacy systems, real-time production metrics, quality control, market trends, and customer feedback. That data must be trustworthy and available in real-time.

When modernizing, an integrated data platform can be your best friend. You'll want to look for a tool that can consolidate and store data from various sources—including on-premises and cloud-- and enable fast and comprehensive analytics. This combination of integration, warehousing, and analytics facilitates deeper understanding and faster, more informed decision-making in the R&D process. By leveraging such a platform, you can better facilitate effective modernization, streamline the transition from old to new systems, and harness the power of data to drive innovation without disrupting ongoing operations.

How the Marvell Nanofabrication Laboratory at UC Berkeley Optimizes Data

The Marvell NanoLab is a shared research center providing a wide range of micro- and nano-fabrication tools to more than 100 principal investigators and over 500 academic and industrial researchers annually.

Challenge

The Marvell NanoLab must manage and analyze a wide range of data collected by its lab management system, Mercury. Mercury is an in-house developed workstation/server based research facility interface and information system designed specifically to operate the Berkeley Marvell NanoLab

Solution

To efficiently manage much of the lab's operations, Marvell NanoLab requires a robust and dependable system for storing and managing operational data. This includes equipment status and reservations, utility system monitoring, researcher credentials and training, and chargeback financials

Outcome

Marvell relies on Actian for scalable and dependable database management to monitor many aspects of the nanofabrication environment. Over decades, the lab has consistently improved its Lab Management Environment (LMS) to adapt to the evolving demands of the lab environment

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Take an Intelligent Approach to Product Design and Prototyping

Data also plays a critical role in shaping innovative, sustainable, and market-ready products during the product design and prototyping phase. The impact of bad data can be particularly severe in this phase, leading to designs that may not be sustainable and prototypes that fail to meet required standards. Poor data can result in extended development cycles, increased costs, and products that ultimately fail in the marketplace. Ultimately, bad data can cost companies across sectors $12.9 million annually.[2]

One key challenge in design and prototyping is the struggle to balance product innovation with sustainability and environmental, social, and governance (ESG) considerations. There is enormous external pressure to produce innovative products that are not only high-performing but also environmentally friendly and socially responsible. The complexity of integrating sustainability into product design often requires data from a wide array of sources, including material properties, supply chain logistics, environmental impact data, and regulatory compliance information.

This is challenging because the data needed for effective product design and prototyping is typically varied and voluminous. It spans technical specifications, user feedback, and performance metrics from similar products, and more. Additionally, this data may come in different formats, making it daunting and seemingly impossible to standardize into a coherent and consistent data format for analysis. And the dynamic nature of design and prototyping means that data must be updated and accessible in real-time to support rapid iterations and refinements, which existing systems might not support effectively.

An integrated data platform can significantly streamline these processes by providing tools that seamlessly standardize data from diverse sources and formats into a single, unified warehouse for real-time analytics. This capability ensures that analysts and engineers have access to reliable, up-to-date, and complete data sets, enabling them to make informed decisions quickly.

Integrating Data for Product Design and Prototyping

Paturle Aciers, a company known for its advanced steel products, leverages the Actian Data Platform to integrate data from various stages of its product development process. By using the platform, Paturle Aciers can optimize technical data from initial design concepts all the way through the final prototyping feedback to ensure that each iteration is based on accurate and comprehensive data. This integration not only speeds up the prototyping process, but also enhances the precision of the designs, leading to more innovative and competitive products on the market.

2 https://atlan.com/cost-of-bad-data/

Infuse Data into Production Planning

The repercussions of relying on bad or incomplete data during the production planning phase of manufacturing can be significant, leading to misaligned production schedules, excess or insufficient inventory, and suboptimal resource utilization. These issues not only inflate costs but hinder your ability to respond swiftly to market changes or customer demands.

The challenges in production planning are multifaceted, involving the alignment of production output with market demand, efficient resource and vendor management, and timely product delivery. One common struggle is with the siloed nature of data, where information from sales, supply chain, and production lines are not integrated. This can and likely will cause delays in response times and inaccuracies in production forecasting, which are critical in managing production cycles. There's also the challenge of incorporating sustainability into production planning, which requires precise data to optimize resource use and minimize environmental impact.

Implementing a data platform can be transformative in addressing these challenges. By consolidating data from various sources into a single, accessible system, the platform enhances forecasting accuracy and resource planning. It integrates data from legacy systems, modern applications, IoT devices, and third-party data providers, providing a holistic view of the production environment. With real-time data ingestion, data warehouse centralization, and analytics, you can respond quickly to changes in production conditions and market demands.

A data platform might also support dynamic scheduling and scenario planning, allowing for adjustments in real-time based on current data. Additionally, it can help maintain optimal inventory levels and automate replenishment processes, reducing carrying costs and ensuring material availability. By facilitating cross-departmental collaboration and providing enhanced transparency, a quality data platform improves decision-making and operational efficiency while supporting sustainability initiatives by optimizing resource use and ensuring regulatory compliance with ESG standards.

Lufthansa Systems Optimizes Routes with Real-Time Data

Lufthansa Systems exemplifies the power of leveraging a sophisticated data solution for planning at a grand scale. By utilizing Actian Ingres for its Lido flight and route planning software, the company achieves a seamless distribution of global aviation data and support. This technology ensures that critical information is not only secure and accessible around the clock but updated in real-time. As a result, Lufthansa can calculate cost-optimal flight routes that generate significant revenue and enhance operational efficiency, demonstrating the crucial role of advanced data management in strategic planning across industries.

"When we compare Actian Ingres to other database technologies on the market, their transactional database continues to be one of the best choices to power this type of mission-critical use case. It's very reassuring to know that our solution, which keeps airplanes and passengers safe, is backed up by a database that has for so many years been playing in the 'premier league'.

–Rudi Koffer, Senior Database Software Architect, Lufthansa Systems

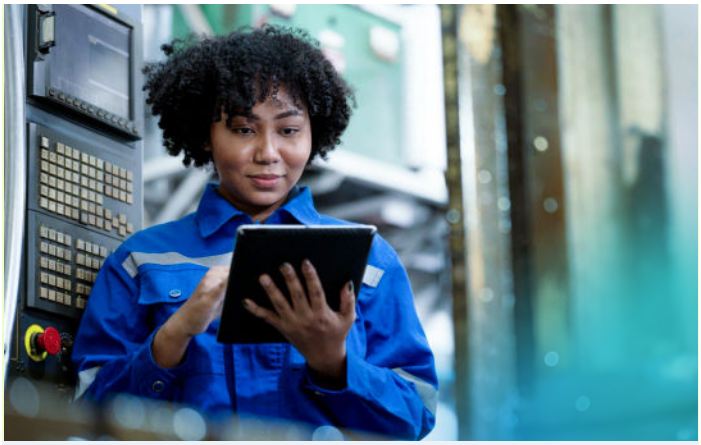
Enable Flawless Manufacturing Execution

Operations are transformed from plans into actual products in the manufacturing execution phase. Here, the role of data is pivotal; bad or inaccurate data can significantly disrupt this phase, leading to inefficiencies that affect everything from machine operations to quality control. Misleading data can cause machinery to operate under suboptimal conditions, increase downtime, and result in products that fail to meet quality standards. Moreover, incorrect data can lead to poor decision-making, affecting the flow of materials and the scheduling of tasks on the production floor. This can cost anywhere from 20% to 35% of your annual revenue.[3] [3]

The challenges in manufacturing execution are largely centered around the real-time nature of data needed to efficiently run production lines. Use cases that highlight the importance of accurate data include the precise control of robotic operations, real-time monitoring of production quality, and immediate adjustments to production processes in response to detected anomalies or shifts in production conditions. Each scenario relies heavily on accurate, timely data to avoid slowdowns, stoppages, or waste of materials.

Once again, integrating real-time data from myriad sources is a chief roadblock to avoiding issues in manufacturing execution. IoT sensors on equipment, input from manufacturing execution systems (MES), updates from enterprise resource planning (ERP) systems, and data from warehouse management systems (WMS) are massively important data sources that often come in various formats and need to be harmonized to be useful. Many manufacturing systems are also burdened with legacy technologies that aren't well suited to the dynamic, interconnected data flows required for modern manufacturing operations, which can hinder real-time data analysis and responsiveness, leading to delays and increased operational costs.

To address these issues, you can benefit from implementing a robust data platform that encompasses integration, warehousing, and analytics. Ideally, this platform would be designed to process and analyze data from diverse sources in real-time, ensuring a comprehensive and accurate view of all facets of the production process. By facilitating seamless data availability across both modern and legacy technologies, this platform enhances decision-making, optimizes production efficiency, and minimizes downtime across manufacturing operations.



The Power of Data Integration

Delivering New and Sustainable Money Savings
A large global bank replaced its legacy Netezza technology with Actian Vector. In addition to gaining actionable insights at lightning-fast speed, the bank dramatically reduced total cost of ownership (TCO) and is on pace to see $20 million in savings over five years.

Realizing Significant Time Savings
Superior Energy Services slashed overall days sales outstanding (DSO) by nearly 20% using Actian Business Xchange. The platform improved cash flow and enables agility to handle changes in the energy sector with less disruption. The company also saves between seven and 12 days of labor per month for billing and invoicing by standardizing processes and using Actian BX.

Gaining a Competitive Business Advantage
The AA analyzes and enriches data to deliver risk-balanced insurance quotes online in 400 milliseconds. The AA gains a distinct competitive edge using the Actian Data Platform on Azure—insurance comparison websites in the UK give top billing to insurers that respond the fastest to quotes.

3 https://www.cluedin.com/cost-of-poor-quality-data

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Drive Efficiencies Across Logistics and Distribution

Challenges in logistics and distribution often revolve around the need for real-time data integration and visibility. Managers need to track shipments accurately, optimize routes based on real-time traffic and weather conditions, and manage warehousing operations effectively. In addition, there's the need to coordinate effectively across various stakeholders, including suppliers, carriers, and customers, which requires robust communication and data exchange protocols.

A major obstacle in enhancing logistics and distribution efficiency is, you guessed it, the fragmentation of data across different systems and platforms. This fragmentation can make it difficult to achieve a holistic view of the supply chain, complicating efforts to optimize logistics operations.

Many existing systems may also struggle to handle the volume and velocity of data generated by modern logistics activities, from GPS tracking to real-time inventory management, further complicating the integration process.

To overcome these challenges, you can benefit from a data platform that enhances real-time data visibility and coordination across the entire supply chain. Such a platform is designed to aggregate and synthesize data from a variety of sources into one unified warehouse and prepare the data for analysis, ensuring that logistics managers have access to the most current and accurate information. This enhanced data capability is crucial for optimizing routing decisions, managing inventories efficiently, and ensuring that deliveries meet customer expectations in terms of timeliness and condition.

Business Problem	Challenge	Solution Outcomes
Route Optimization	Lack of real-time data availability and poor data quality can lead to suboptimal routing that increases fuel costs and delivery times	More efficient routes lead to reduced fuel consumption, faster delivery times, and up to 30% lower operational costs[1]
Inventory Management	Poor data accuracy in inventory levels due to delayed data synchronization leads to either excess inventory or stockouts, both costly to the business	Improved stock levels match demand, reduce carrying costs, and minimize losses from unsold goods, which account for 20%-30% of a company's revenue[2]
Demand Forecasting	Fragmentation and siloing of critical sales and market trend data hinder effective analysis. Poor forecasting from inadequate data integration can result in overproduction or underproduction, affecting profitability	More accurate production levels and stock management leads to optimized operations, up to 37% reduction in waste, and a 20% cost savings[3]
Regulatory Compliance and Security	Maintaining up-to-date and accurate compliance data across global systems is challenging. Non-compliance due to data errors or delays can lead to legal penalties and reputational damage	Enhanced compliance with reduce risk of penalties of thousands of dollars per day, and improve reputation and trust among stakeholders

1 https://www.paragonrouting.com/en-us/blog/post/is-route-optimization-worth-the-money/#:~:text=The%20big%2Dpicture%20view%20is,million%2C%20that's%20quite%20a%20saving

2 https://www.investopedia.com/terms/c/carryingcostofinventory.asp#:~:text=Inventory%20carrying%20cost%20is%20the,of%20its%20total%20inventory%20value

3 https://aws.amazon.com/blogs/machine-learning/reduce-food-waste-to-improve-sustainability-and-financial-results-in-retail-with-amazon-forecast/

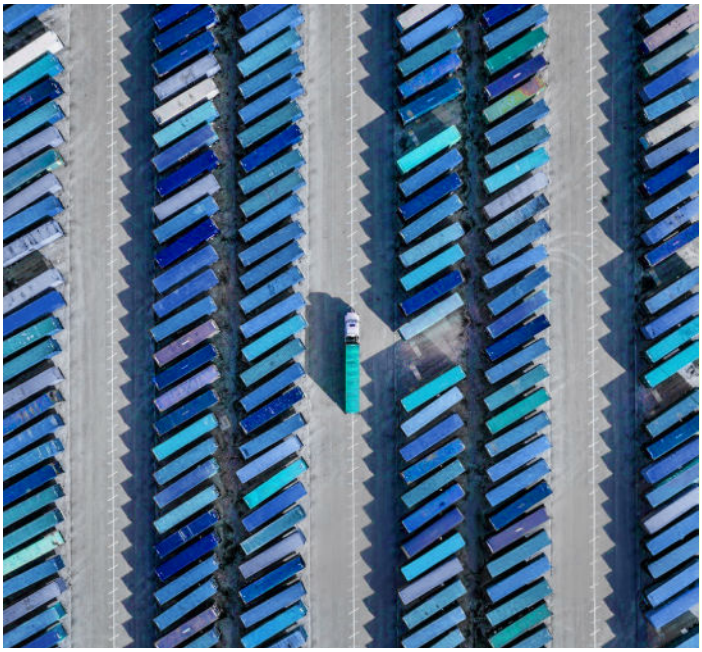
Data Mastery with Actian: Driving Manufacturing Excellence at Every Phase

Just as a blueprint is essential for constructing a well-built house, a robust data platform is crucial for efficient and effective manufacturing operations. It provides a clear plan, integrates all data sources, and ensures that every aspect of production is aligned and optimized.[4]

From sparking initial innovations in R&D to ensuring that every product reaches its destination efficiently, data acts as the lifeblood of the manufacturing process. But not just any data—a robust, accurate, and real-time stream of information that informs decisions at every level and turn. Without this, you risk making decisions in the dark, leading to inefficiencies, wasted resources, and missed opportunities.

That's where a solution like the one from Actian comes into play. It's not just about having data; it's about having the **right** data, perfectly integrated and immediately accessible across all phases of manufacturing. The Actian Data Platform ensures that whether you're in the thick of designing cutting edge-prototypes, planning your production down to the last bolt, or coordinating complex logistics, you have the clarity and insights you need right at your fingertips.

With Actian, the promise isn't only in handling data—it's about transforming it into a superhighway of information that propels every phase of the manufacturing process forward. This isn't just about staying competitive, it's setting the pace and leading the charge in innovation, efficiency, and delivery. In a world where integration and quality data are king, Actian helps you wear the crown.



About Actian

Actian makes data easy. We deliver cloud, hybrid cloud, and on-premises data solutions that simplify how people connect, manage, and analyze data. We transform business by enabling customers to make confident, data-driven decisions that accelerate their organization's growth. Our data platform integrates seamlessly, performs reliably, and delivers at industry-leading speeds. Learn more about Actian, a division of HCLSoftware: **www.actian.com**.

4 https://7t.co/blog/compliance-goes-digital-in-transportation-ensuring-safety-and-security/

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