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AMAZON WEB SERVICES

Cloud Solutions for Manufacturing

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Delivering manufacturers greater efficiency, sustainable operations, and new revenue streams through the cloud

Manufacturers of all sizes and in different industry segments are facing disruptions that have forced changes to supply chains, internal operational processes, and business models. To be successful, firms have realized they need to focus on new ways of increasing efficiency and output while improving product quality, innovating with new products and business models, and supporting employees wherever they work.

Many manufacturers use world-class Overall Equipment Effectiveness (OEE), or the average time that a discrete factory is performing based on its available capacity, to baseline their operations and improvement efforts through digital transformation. OEE among factories averages 85 percent.[1] But most manufacturers are far below that. The goal is as relevant to large factories as it is to smaller ones. In fact, for smaller manufacturers with lower volumes and tighter margins, OEE is even more important to profitability. To achieve high OEE involves a combination of objectives, including reducing downtime, optimizing processes, and maximizing quality yields to increase productivity and the profitability of the operation. Each of these can have major impacts: Downtime alone costs industrial manufacturers an estimated $50 billion each year, according to recent studies.[2]

[1] "The ABCs of Overall Equipment Effectiveness," **Manufacturing.net**, 2007
[2] "Predictive Maintenance and the Smart Factory," Deloitte, 2007.
[3] "INVISTA Transforms Operations by Optimizing Manufacturing Outcomes on AWS, **case study**, 2020.

"By using AWS to pull ordering patterns and other data from our SAP ERP system, we have a closed-loop, fully automated stocking process for high-moving spare parts that has shown significant return on investment."

– Elizabeth Gonzalez, Analytics Leader, Koch Industries[3]

Challenges in the manufacturing sector

With 81 percent of manufacturers in a recent survey saying they routinely have cost overruns due to quality issues and 55 percent saying they have major security concerns about their supply chains, it's clear that new solutions are needed.[4] Going forward, a majority in the study agreed on the need to enhance speed, quality, security, sustainability, and resilience to address these and other strategic challenges. These goals are shared across manufacturers of all sizes but are particularly challenging for organizations with limited budgets and resources.

When the data-driven enterprise initiative meets the supply chain and operations organization, an initial challenge is capturing the vast amount of data from various sources, such as machine sensors, quality assurance systems, suppliers, production output, maintenance, financials, etc. Liberating, structuring, and integrating data to derive new insights is required for a complete view of operations.

Yet more than half of manufacturers either haven't started or are just beginning to experiment with technologies that gather, integrate, and connect data to analytics systems or artificial intelligence algorithms.[5]

"We are using AWS data analysis technologies to predict … precisely how fast converting lines should run to avoid tearing. By reducing paper tears, we have increased profits by millions of dollars for one production line."

– Steve Bakalar, VP of IT & Digital Transformation, Georgia Pacific[6]

Attacks on operational infrastructure continue to increase, growing by 300 percent globally in 2020,[7] making factory security a critical issue. A security incident can halt production. More smart machines and devices are appearing in industrial settings. They must be developed with Internet of Things (IoT) features to provide differentiated product benefits as well as security to protect Original Equipment Manufacturers (OEMs) and their customers as the attack surface increases. Aging assets are another risk, with 75 percent of U.S. factory assets being more than 20 years old. Much of this legacy equipment is unable to run the newest security software or was designed before cybersecurity was ever a consideration.

Cost reduction is also a challenge and an opportunity. A recent study found that 36 percent of manufacturers realized above-average business value in return for digitization spending.[8] From reducing the use of water, air, gas, electricity, and steam (WAGES) to maintaining a lean workforce and minimizing waste, you need to relentlessly focus on reducing costs to remain competitive and maximize your profitability.

[4] "2021 State of Manufacturing: Digital Transformation is the Key to Winning in the 'Next Normal,'" **Forbes**, 2021.
[5] "Navigating the Fourth Industrial Revolution to the bottom line," **PwC**, 2021.
[6] "Georgia-Pacific Optimizes Processes, Saves Millions of Dollars Yearly Using AWS," **case study**, 2021.
[7] "NTT Global Threat Intelligence Report," **NTT**, 2021.
[8] "Digital Transformation in Manufacturing," **Gartner**, 2021.

"Using AWS has been a real game changer for us in terms of product innovation and process digitalization, enabling us to shorten our time to market and increase operational efficiency while maintaining a data-driven focus."

– Gabriele Ballarin, Chief Information Officer, UNOX[9]

Reducing energy use is a top objective for manufacturers because it enables them to achieve their sustainability goals while lowering costs. Many AWS customers, like Siemens, Mercedes Benz, and Coca-Cola, have signed the Climate Pledge and are working to achieve net-zero annual carbon emissions by 2040. As part of Amazon's mission to be Earth's most customer-centric company, we are committed to building a sustainable business for our employees, customers, and communities. For example, AWS worked with Coca-Cola İçecek to implement an AWS IoT solution and a digital twin to create new clean-in-place solutions that reduce energy and water use.

To modernize the manufacturing business and take full advantage of the newest data and analytics innovations, manufacturers need:

- Access to trapped data in the factory
- Secure storage of that data where it can be easily accessed
- Computer vision for quality inspection that scales and reduces costs related to rolled throughput yield
- A product or machine-as-a-service model that enables outcome-driven service level agreements (SLAs)

[9] "UNOX Meets 95% of Service-Level Customer Requests, Drives Innovation by Going All in on AWS," **case study**, 2021.

Why cloud solutions are the first step toward greater efficiency and sustainability

Digitization has become vital for every business and a growing number of businesses in every industry are using cloud services to do things better, faster, and more economically. For manufacturers, the cloud can be a key enabler to their efforts to make their operations more efficient, agile, and environmentally sustainable.

Cloud-based software and services unlock new opportunities for manufacturers, in terms of access to the full breadth of their data, as well as IT expertise. Instead of carrying the burden of supporting a computing infrastructure, cloud allows manufacturers to focus on more pressing goals—building more efficient, safer, and more productive operations, delivering quickly for their customers, and ultimately growing the business. Powerful Cloud-as-a-Service (CaaS) applications and specialized solutions are available for every department, from engineering and design to manufacturing, operations, supply chain, service chain, and business operations.

Data throughout manufacturing environments—upstream and downstream—can be gathered, integrated, and made useful. The insights gleaned from data analytics can help operations leaders better understand the variables impacting OEE to ultimately take action that drives continuous improvement and achieves increased availability.

With cloud solutions in place, computing capacity can rise or fall to meet demand, while manufacturers are only charged for what is actually used—ensuring they have the space to grow without paying for more than they need. Cloud services constantly monitor activity to balance loads, scaling compute power and storage up or down to meet fluctuations in demand and reduce unnecessary fixed costs.

Why Amazon Web Services for manufacturing

Amazon Web Services (AWS) first pioneered cloud services for Amazon's fulfillment centers to distribute billions of products and use cutting edge industrial automation, machine learning, AI, and robotics—all with AWS at the core.

Today AWS provides manufacturing companies with the most comprehensive and advanced set of cloud solutions available. The development organization behind the AWS Cloud launches more new features at a faster pace than any other cloud provider. Our unmatched portfolio includes more than 200 services, including cloud-native services like rotating **equipment monitoring** and **defect anomaly detection**, which allow our industrial customers to optimize operations and innovate quickly.

Moving to the AWS Cloud has a transformative effect on manufacturing.

For Arneg SpA, a commercial refrigeration manufacturer, AWS provides a predictive maintenance model using IoT infrastructure and machine learning to predict maintenance needs with 80+ percent accuracy.[10]

Coca-Cola İçecek, a bottler across Asia and the Middle East, used AWS to create a digital twin to optimize 26 bottling plants, deploying improvements that resulted in annual savings of 20 percent in electricity,
9 percent in water, and 34 days of processing time.[11]

Mikatasa, a home decor manufacturer and retailer, saved 30 percent and reduced in half the IT staff needed to maintain their core on-premises systems by moving them to SAP Cloud.[12]

Source: AWS customer case studies

AWS manufacturing features and benefits

AWS helps manufacturers innovate faster. With AWS and our extensive network of industrial partners, you can transform your engineering, design, and simulation efforts with the most comprehensive set of cloud solutions available today, while leveraging the highest level of security to protect your intellectual property. When they work with AWS, manufacturers of any size can gain:

- **Improved OEE:** AWS has tools that can improve manufacturing operations by capturing, analyzing, visualizing, and gleaning new insights from plant floor data. You can also improve business operations by enabling access to disparate plant data to improve OEE.
- **Intelligent supply chain:** In the AWS Cloud, the supply chain is intelligent and versatile. Our customers take advantage of intelligent automation for demand planning and warehouse management backed by machine learning-based forecasting.

[10] "Arneg Predicts Customer Maintenance Needs Worldwide Using Amazon Forecast and Amazon SageMaker," **case study**, 2020.
[11] "Coca-Cola içecek Improves Operational Performance Using AWS IoT SiteWise," **case study**, 2021.
[12] "Mikatasa Sticks to AWS to Paint a Digital Customer Experience," **case study**, 2020.

- **The highest level of cloud security:** AWS security infrastructure is built to satisfy the stringent requirements of the world's leading financial, educational institutions, and governmental institutions. AWS compliance programs include 230 security features and services.
- **Advanced, data-driven applications:** With access to computer vision, IoT services, edge computing, data lakes, and advanced analytics tools, manufacturers can capture, analyze, and visualize data from machines to improve your OEE.
- **Real savings you can see and measure:** You'll realize the savings that cloud brings year after year. We offer free tools and calculators to assess your workload and costs and measure your migration ROI—taking the guesswork out of operational costs and identifying new opportunities to save. Further, we have reduced our costs to users more than 100 times over the last decade, returning more than half a billion dollars to our customers.
- **Dedication to business innovation:** As one of the world's most innovative companies, built on a foundation of customer obsession, AWS technology and teams are dedicated to helping organizations of all sizes innovate to achieve their business goals. We share Amazon's unique approach to innovation to empower customers to unleash their creativity—enabling experimentation, iteration, and the ability to uncover new opportunities and revenue streams.

"With AWS, we got our product to market in six months instead of once a year, and we can now confidently release new code up to ten times a week instead of once each quarter."

– Juhana Enqvist, Chief Digital Officer, Kemppi[13]

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Get started with cloud at your own pace

Using the AWS Cloud isn't an all or nothing decision. Your company can move at its own pace based on the most pressing challenges and opportunities. A good way to start might be with migrating specific applications, like engineering and design software. In the cloud, engineering and development will run faster, cheaper, and remotely for faster time to results.

Next, build a data lake on the AWS Cloud. Liberate the data from all of your different systems, homogenize it, provide access, visualization, analytics, and reporting. Another step might be to improve quality by analyzing quality issues, perhaps as part of collaborative Lean Six Sigma efforts, with the use of machine learning to reduce defects and lower costs or adding a condition monitoring application that provides the ability to perform proactive maintenance on factory machines before they have problems. Finally, the AWS Cloud has applications for smart products that can help manufacturers monitor how products are being used and analyze customer sentiment through communications and social media.

The AWS advantage

Cloud services are an essential tool for manufacturers. Benefits range from cost reduction to higher efficiency and more sustainable operations. The AWS Cloud gives manufacturers of all types and sizes the opportunity to reconsider costly capital investments and internal expertise and instead move storage, computing, and networking to the leading cloud partner with ready-made or custom solutions. AWS was born from complex automation and factory operations at Amazon and provides manufacturers with a wide array of services on the AWS Cloud that easily scale with changing requirements. Our global expertise in the manufacturing industry, history of developing industrial solutions for Amazon Fulfillment Centers, and our diverse partner network is available to support your company's cloud journey, wherever it begins.

To learn more, visit **AWS Manufacturing**.