WHITE PAPER

Revolutionizing manufacturing through data-driven excellence

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01. The data advantage

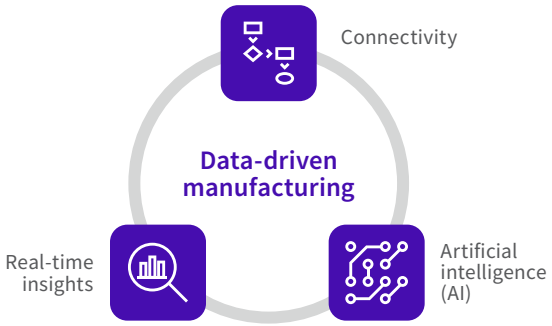
The impact of technology on modern manufacturing can't be overstated.

It has changed the way we think about every stage of the product lifecycle, from inception and design to production. Real-time access to data has transformed the shop floor, enabling companies to drive better decision-making, reduce time to market, and improve the efficiency and quality of their products and services.

This transformation is primarily fueled by the way top companies are acquiring and utilizing data. In this paper, we will investigate the effects and characteristics of data-driven manufacturing and how it marks a significant change in the way contemporary manufacturers conduct their operations.

Data-driven manufacturing combines real-time insights, connectivity, and artificial intelligence (AI) to augment traditional data analytics and drive improvement across the organization, from the factory floor to supply chain and planning.

Leveraging data to drive improvement is a strategic response to the increased market demands being placed on manufacturers. The challenges of rapidly shifting customer preferences, economic fluctuations, supply chain disruptions, and increased global competition have driven companies to pursue more complex and nuanced insights to remain competitive.



> Leveraging data to drive improvement is a strategic response to the increased market demands being placed on manufacturers.

Data-driven manufacturing has enabled many firms to identify and eliminate inefficiencies to streamline operations and overcome the constraints of traditional manufacturing methods. Today, leading manufacturers are using both internal and external data sources to drive activities beyond the manufacturing process itself.

Some examples include:

Increase productivity: Data-driven manufacturing enables real-time access to production data. This allows production schedulers, managers, and shopfloor supervisors to quickly course-correct when unplanned events occur. In addition, production data can point to inefficiencies and other bottlenecks that impact production and result in inventory disruptions and quality issues.

Curate personalized and innovative customer experiences: Data-driven manufacturing provides organizations with insights into how their customers procure and use their products. This information enables manufacturing firms to customize products to meet a specific customer's needs. In addition, data on how and where a customer buys their products allows companies to streamline the purchasing process and reduce lead times to enhance customer experiences and help to increase brand loyalty.

Elevate social and environmental impact[1]: By providing transparency into a company's energy efficiency and emissions, data-driven manufacturing provides customers with critical information regarding the way a given product has been produced. Manufacturing data can be used to track "cradle to grave" product lifecycle information, tracking everything from how raw materials were sourced to the disposal of the item once its useful lifecycle is completed.

By adopting data-driven manufacturing, organizations unlock the potential to adapt, optimize, and innovate in unprecedented ways.

1 "The Future of Manufacturing is Powered by Data and Analytics. Here's Why," World Economic Forum, September 9, 2022.

02. Manufacturing in the digital age

According to the Manufacturing in 2030 Project survey by the Manufacturing Leadership Council, over 84% of industry leaders anticipate a significant increase in the adoption of digital technologies in the coming years.[2]

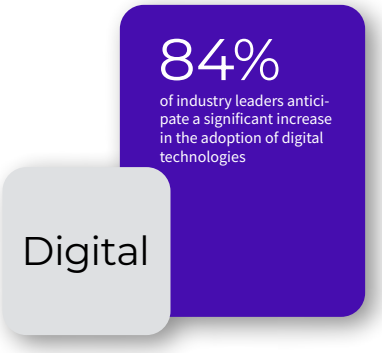
In this context, data-driven manufacturing becomes an essential tool, equipping manufacturers with the strategies necessary to excel in an increasingly competitive manufacturing environment.

The advantages of an integrated data-driven manufacturing environment enable companies to proactively address exceptions and other variances in their production plans to optimize the shop floor and keep product shipping.

Beyond the four walls of the factory, data-driven manufacturing provides new insights into the market, enabling firms to react faster and more precisely to competitive challenges, labor shortages, sustainability demands, and other headwinds that simply can't be addressed with traditional ERP platforms.

In addition, data-driven manufacturing can be a powerful driver of innovation within a manufacturing company by revealing new insights into the company's operations while fostering a culture of continuous improvement.

While the adoption of data-driven manufacturing practices is still in the early stages, many companies are already reaping the benefits. While many firms are initially drawn to the promise of increased competitiveness and sustainability, data-driven manufacturing delivers on many fronts and drives several critical outcomes.



2 "A Lens on the Future," Manufacturing Leadership Council, November, 2022.

Critical outcomes:

Data analytics and insights: Advanced analytics can uncover patterns and trends that might otherwise be missed. Furthermore, predictive models can help companies anticipate changes in customer demand allowing for proactive innovation and product development.

Customer-centric personalization: With greater insight into customer habits and preferences, manufacturing companies can tailor products and services to individual customer preferences.

Quality: By accessing and monitoring a variety of production and field data, companies can identify opportunities for improving product quality. This may lead to the development of innovative manufacturing techniques, materials, or technologies that result in higher-quality products.

Production control: Real-time data from sensors and equipment enable companies to respond quickly to deviations and adapt processes in real-time for improved efficiency and quality.

Customer insights: By analyzing customer data, manufacturers can gain insights into customer preferences and needs, which can inspire product innovations and new features.

Digital twins: Digital twins enable simulation and experimentation, allowing companies to test and refine innovative ideas quickly at a low cost, without affecting actual production.

Supply chain optimization: Increased supply chain transparency through data-driven insights enables innovation in logistics and distribution that reduces costs and increases responsiveness to customer demands.

AI and machine learning: Machine learning algorithms can uncover hidden patterns and suggest innovative solutions for process optimization, quality control, and demand forecasting.

Internet of Things (IoT): IoT devices can provide real-time data about equipment performance and environmental conditions, providing better insights to drive innovative maintenance strategies and product design.

Continuous improvement culture: Data-driven manufacturing fosters a culture of continuous improvement, where employees are encouraged to seek innovative solutions to ongoing challenges.

Feedback loops: Data can provide a feedback loop for product development and improvement. Customer feedback and real-time data can inform iterative design and manufacturing processes.

Sustainability: Data-driven manufacturing supports innovative initiatives related to sustainability, such as recycled content, and scrap reduction/reuse product lifecycle leading to an overall reduction in the environmental impact of manufacturing processes.

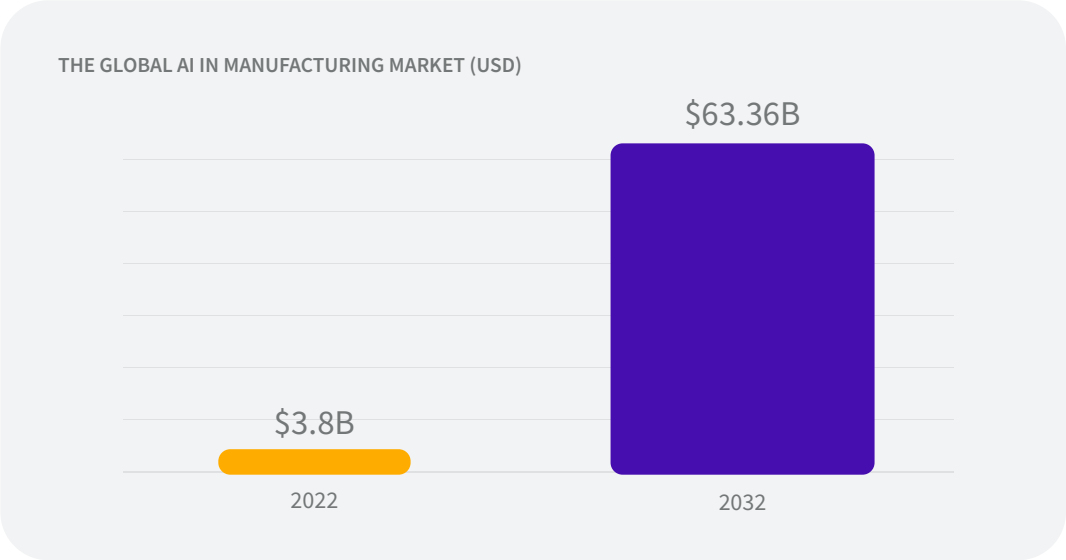
Summary: Many leading firms are already engaged in leveraging data-driven manufacturing principles as a mechanism for innovation. From product design to process optimization and sustainability, data-driven manufacturing provides companies with the tools to experiment, adapt, and continuously seek new solutions to improve productivity, product quality, and customer satisfaction.

03. Smarter planning and resilient production

Data-driven manufacturing is all about making informed decisions by leveraging the potential of data.

This begins with the collection of extensive data, both historical and real-time, and then leveraging the power of AI to provide predictive insights, automate complex processes, and enable real-time decision-making to optimize operations and gain an advantage in the market.

A recent report by Precedence Research forecasts that the global AI in manufacturing market size will increase from $3.8 billion US in 2022 to $68.36 billion US by 2032, growing at a compound annual growth rate (CAGR) of 33.5% over this forecast period.[3]



In this context, it becomes clear that for leading manufacturing firms, the ability to leverage data-driven insights has become key to thriving in the manufacturing landscape of the future. Advanced analytics for strategic decision-making is no longer an option; it is a necessity.

3 "Artificial Intelligence (AI) in manufacturing market," Precedence Research, June, 2023.

We've highlighted seven advantages of employing data-driven manufacturing for organizations.

Use case 1: Operational improvements

Unlock new insights: Instead of relying on historical precedents, anecdotal evidence, or intuition, which has limited capacity to adapt to change or to capitalize on emerging opportunities, decisions grounded in data analysis leverage the wealth of information at the manufacturer's disposal to steer operations with precision and insight.

> **Outcome:** Data-driven decisions lead to more efficient resource allocation, cost reduction, and increased productivity across the manufacturing ecosystem.

Identify bottlenecks: Having real-time insights into the production process allows for swift responses, effectively reducing the impact of bottlenecks. When a production slowdown or obstruction arises, the system detects it, and an adjustment or recalibration can be carried out.

> **Outcome:** This approach reduces downtime and enhances overall efficiency.

Optimize workflow: With a holistic view of their workflow, manufacturers can monitor every stage of the production process, from raw material input to finished product output. With this organizational data at their fingertips, organizations can pinpoint redundancies and systematically optimize workflow.

> **Outcome:** By streamlining workflow, organizations reduce waste, cut costs, and improve resource utilization.

Leverage AI-driven tools: Organizations turn to AI-driven tools and technologies to attain a higher level of operational excellence, as these are adept at processing vast amounts of data swiftly. By integrating AI into data analysis, organizations can uncover deeper operational insights and strategies. AI algorithms identify subtle correlations, hidden patterns, and improvement opportunities often overlooked by humans.

For instance, AI can:

- Monitor machine performance, suggest settings for maximizing output, and identify opportunities to conserve energy and reduce wear and tear, ultimately improving operational efficiency and equipment lifespan
- Analyze historical data and demand forecasts, ensuring organizations maintain the right stock levels to meet customer demand while minimizing holding costs
- Monitor product quality in real-time on the production line, identifying defects or deviations from quality standards, and recommending adjustments to improve quality and reduce waste

> **Outcome:** AI-driven insights are the cornerstone of maintaining agility and competitiveness in manufacturing. They provide organizations with a data-driven edge, facilitating quick and precise process adjustments, responsiveness to market shifts, and proactive opportunity capture in a competitive manufacturing environment.

Customer success story

From manual to AI-powered: Camatic Seating's path to success

Challenge

As a global seating solution provider, Camatic struggled with a vast amount of data in their CRM system, making it difficult to identify key success-driving metrics and leading to inefficiencies due to irrelevant data.

Additionally, its manual forecasting process was time-consuming and error-prone, which hindered accurate demand prediction, leading to production inefficiencies.

Solution

Camatic integrated Infor Coleman AI, improving their forecasting accuracy and enabling better alignment of production capacity with demand.

This Infor solution also helped Camatic extract valuable insights from their CRM data, allowing them to make informed, data-driven decisions and allocate resources more effectively.

Outcome

Implementing the solution streamlined their operations, saving staff valuable time and ensuring timely product deliveries to customers, delivering tangible business value, including a significant 5% increase in win rates.

Learn more about Infor's solution for Camatic Seating

LEARN MORE

CAMATIC SEATING

Use case 2: Quality enhancement

Fewer defective products: Data-driven manufacturing helps organizations implement proactive quality control measures through real-time monitoring, enabling them to quickly identify deviations from quality standards. This approach ensures that products consistently adhere to predefined quality benchmarks.

Outcome: Swift detection of defects or anomalies reduces the production of defective items and lowers the risk of such products reaching customers. This enhances the organization's reputation for delivering high-quality goods, leading to greater customer satisfaction and a competitive edge in the market.

Less waste, lower cost: Addressing quality issues early in the manufacturing process results in a significant reduction in the production of faulty products, leading to minimizing the amount of scrap and rework, as well as a reduction in waste. Additionally, it reduces the need for disposal of defective products, leading to substantial cost savings.

Outcome: Streamlined operations and improved resource allocation thanks to a diminished need for costly rework and disposal of defective items. These cost-efficient aspects of data-driven manufacturing contribute to enhanced profitability and sustainability for manufacturing organizations.

Use case 3: Predictive maintenance

Staying a step ahead: By continually monitoring data collected from sensors integrated into various equipment and machinery, organizations gain crucial insights into the operational condition of their assets.

Through the analysis of this data, organizations can spot irregularities and anticipate when critical machinery is at risk of malfunctioning.

This predictive capability is a game changer, as it enables proactive maintenance planning, allowing issues to be addressed before they escalate into expensive failures and unplanned downtime.

Outcome: Accurate prediction of machine failures and proactive maintenance minimize disruptions to production, resulting in more uptime and higher efficiency.[4]

4. "What is Industry 4.0?," IBM

Use case 4: Supply chain optimization

Putting your data to work: Data analytics is indispensable for the manufacturing industry as it can help identify problems in advance while enhancing the efficiency of daily operations.[5]

It deciphers vast volumes of data, extracting valuable insights from internal and external sources to optimize the entire spectrum of an organization's supply chain.

This extends beyond the confines of the manufacturing shop floor, for example:

Demand forecasting: Align production and distribution with anticipated demand by considering historical data, customer behavior, and future demand trends. This approach reduces lead time and enables adaptation to evolving customer preferences.

Inventory management: Predict demand patterns, identify seasonal fluctuations, and analyze market trends and historical data, to make decisions regarding when and how much to restock. This eliminates excess inventory that ties up capital, ensuring products are consistently available when customers require them.

Distribution and logistics: Enhance transportation routes and delivery schedules through real-time tracking, data analysis, and on-the-go adjustments. This increases the efficiency of distribution and logistics operations.

Supplier relationship management: Monitor and evaluate supplier performance, and analyze metrics such as delivery timelines, quality control, and cost efficiencies to identify areas for improvement and foster stronger, more collaborative supplier relationships. This can lead to cost savings and higher-quality products within the supply chain.

Outcome: By using data analytics to optimize demand forecasting, inventory management, distribution, logistics, and supplier relationships, organizations can reduce lead times, eliminate excess inventory, improve delivery schedules, and foster cost-effective collaborations, resulting in higher customer satisfaction and increased profitability.

Use case 5: Customization

A customer-first mindset: Leading organizations are leveraging advanced AI and predictive analytics tools to tailor products and services to customer preferences, creating products that resonate deeply and enhance customer satisfaction and loyalty.

Personalization is no longer a luxury; it is a competitive necessity that represents the convergence of data and technology with creativity and emotional connection.

Organizations that invest in understanding their customers on a granular level will forge lasting connections that drive brand advocacy and long-term customer relationships.

Outcome: With data-driven curation catering to customers' unique tastes and lifestyles, organizations can increase profit margin while maintaining production efficiency.

5. "How big data and AI can deliver results," Business Tech Weekly, April, 2022.

Use case 6: Agility

A journey of improvement: The core of data-driven manufacturing lies in combining real-time manufacturing data with advanced analytics, allowing organizations to respond rapidly to market changes and enhance strategic planning.

Embracing data-driven manufacturing empowers organizations to swiftly make informed decisions, which in turn fosters a culture of continuous improvement where teams use data to drive precision and adaptability.

For instance, teams can leverage historical data to establish performance benchmarks and define key performance indicators (KPI) goals for efficiency and quality. These benchmarks serve as clear targets for agile improvement efforts.

Outcome: Organizations that embrace data-driven manufacturing gain a distinct competitive advantage. They can swiftly adapt to market shifts, produce higher-quality products, and provide superior customer experiences. By consistently outperforming their peers, these organizations achieve greater sustainability and strengthen their market position.

Use case 7: Sustainability

Going green: Data-driven manufacturing can play a role in helping organizations achieve their sustainability goals. By analyzing energy consumption data and optimizing processes, leading organizations can not only reduce their environmental footprint but also realize significant financial benefits.

According to the Association of German Engineers, going digital has the potential to reduce carbon emissions by 20% and may result in a 25% increase of resource efficiency.[6]

The top three sectors with the highest emissions in 2020 were Energy, Materials, and Mobility, contributing 34%, 21%, and 19% of the total emissions, respectively. These are also the sectors where digital technologies have the greatest potential to decrease emissions. In fact, by promptly embracing digital technologies, these industries can already reduce emissions by 4-10%.[7]

Additionally, if digital technologies are implemented on a large scale across these industries, they could contribute to as much as 20% of the emissions reduction needed by 2050 to align with the net-zero trajectories outlined by the International Energy Agency for the Energy, Materials, and Mobility sectors, according to an analysis conducted by Accenture in collaboration with the World Economic Forum.[7]

Data-driven manufacturing has the capability to help align business practices with a commitment to environmental stewardship, demonstrating that environmental sustainability and financial profitability are interconnected.

Outcome: By leveraging data at various production stages, organizations can pinpoint areas for waste reduction and reduced energy consumption, yielding cost savings and benefiting the environment.

6. "Environmental Sustainability of Digitalization in Manufacturing: A Review," MDPI, December 9, 2020.

7. "Digital Solutions can Reduce Global Emissions by up to 20%. Here's How," World Economic Forum, May 23, 2022.

04. How ERP drives data-driven operations

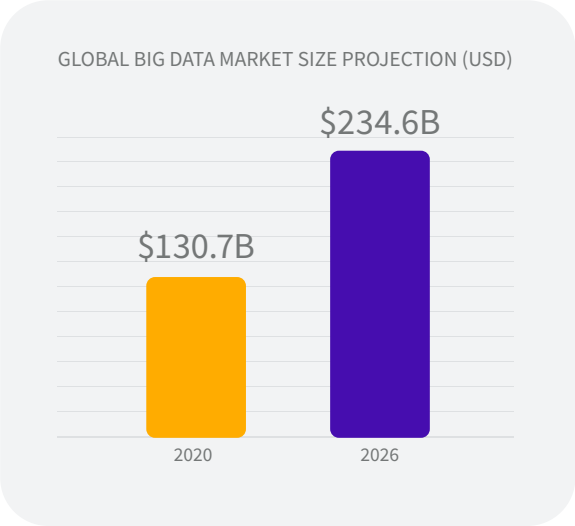
Enterprise Resource Planning (ERP), in its simplest form, is a comprehensive solution used by organizations to manage daily operations, covering everything from procurement and project management to manufacturing processes and sales.

The main goal of ERP is to simplify and automate workflows, leading to increased productivity and agility. However, modern ERP systems are much more than mere automation tools; they empower organizations to leverage industry-specific technology and manage their business processes in real-time.

Leading organizations recognize the value of advanced ERP systems tailored to their industry requirements, viewing these systems as strategic assets that enhance efficiency, intelligence, and productivity.

As more ERP platforms migrate to the cloud, the innovation, data-driven processes and decision support are becoming the norm.

The increased demand for big data in recent years underscores this trend—the global big data market size, estimated at $130.7 billion US in the year 2020, is projected to reach $234.6 billion US by 2026.[8]



8. Global Industry Analysts, Inc.,"Global Big Data Market to Reach $234.6 Billion by 2026," June 29, 2021, press release.

Four ways ERP supports data-driven manufacturing in agile, competitive organizations:

1. Foster continuous innovation: Cloud ERP software receives regular updates, allowing manufacturers to adopt industry best practices and cutting-edge technologies. This enables organizations to adapt to changing business models, expand to new locations, and diversify products.

2. Access real-time data: Cloud ERP systems provide live insights into operations, offering real-time data on production status, inventory levels, and supply chain performance. This immediate access helps manufacturers respond swiftly to changing conditions and unforeseen challenges.

3. Enhance user engagement: Modern ERP systems prioritize user-friendliness, empowering employees to interact seamlessly with the system. This user-centric approach facilitates easy data access, leading to a better return on investment (ROI). Employees can work more efficiently, spending less time on data retrieval and more time executing strategic tasks.

4. Improve decision-making: These solutions streamline data integration across business segments, facilitating the analysis of key performance indicators (KPIs) and data-driven decision-making for operational efficiency. Leveraging data insights through modern ERP systems allows organizations to gain a competitive edge by anticipating market shifts, forecasting trends, and assessing financial impact.

Customer success story

Combilift's journey to enhanced client satisfaction with Infor AI solutions

Challenge

With a diverse fleet of 60,000 trucks across various industries, Combilift, the world's largest manufacturer of multidirectional forklifts, knew there was a crucial need to ensure that their trucks operated optimally with minimal downtime to satisfy their customers.

Solution

Infor Coleman AI solution enabled them to streamline their processes, and eliminated the need for manual records or drawings, resulting in more accurate quotations.

Outcome

Combilift's service jobs were completed 30% faster, reducing downtime and increasing operational efficiency.

There was a 40% decrease in the cost of completing services, contributing to cost savings.

Learn more about Infor's solution for Combilift

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COMBiLiFT
LiFTING INNOVATION

05. A new era in manufacturing

Fueled by data analytics, data-driven manufacturing has shifted from being optional to becoming a necessity in today's dynamic business environment.

This transformation is motivated by the pursuit of sustainability and competitiveness, addressing formidable challenges including global competition, the need for cost-effectiveness, and sustainability goals.

As a testament to the potential of advanced data analytics, the global AI in the manufacturing market is poised for exponential growth.

This presents an intriguing opportunity for leading organizations seeking to overcome current operational constraints and enhance their agility and responsiveness.

Start experiencing enhanced operational efficiencies, improved product quality, and a competitive advantage that propels your business forward. Embrace a data-driven future with Infor.

About Infor

Infor is a global leader in business cloud software products for companies in industry specific markets. Infor builds complete industry suites in the cloud and efficiently deploys technology that puts the user experience first, leverages data science, and integrates easily into existing systems. Over 67,000 organizations worldwide rely on Infor to help overcome market disruptions and achieve business-wide digital transformation.

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