MANUFACTURING

AIQRATE

A Bespoke AI Advisory & Consulting Firm

GLOBAL AI ADOPTION REPORT 2021

Accelerate | Accentuate | Augment

Volume 5

The AI in Manufacturing market is expected to be valued at USD 16.7 billion by 2026; is expected to grow at a CAGR of 57.2% during the forecast period

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Overview

AI can locate and solve pain points in manufacturing value chain and will have perceivable impacts on the entire industry over the next two to five years. The most critical pain points manufacturing companies include rising costs, inflexible design of production lines, as well as unstable quality and yield of products.

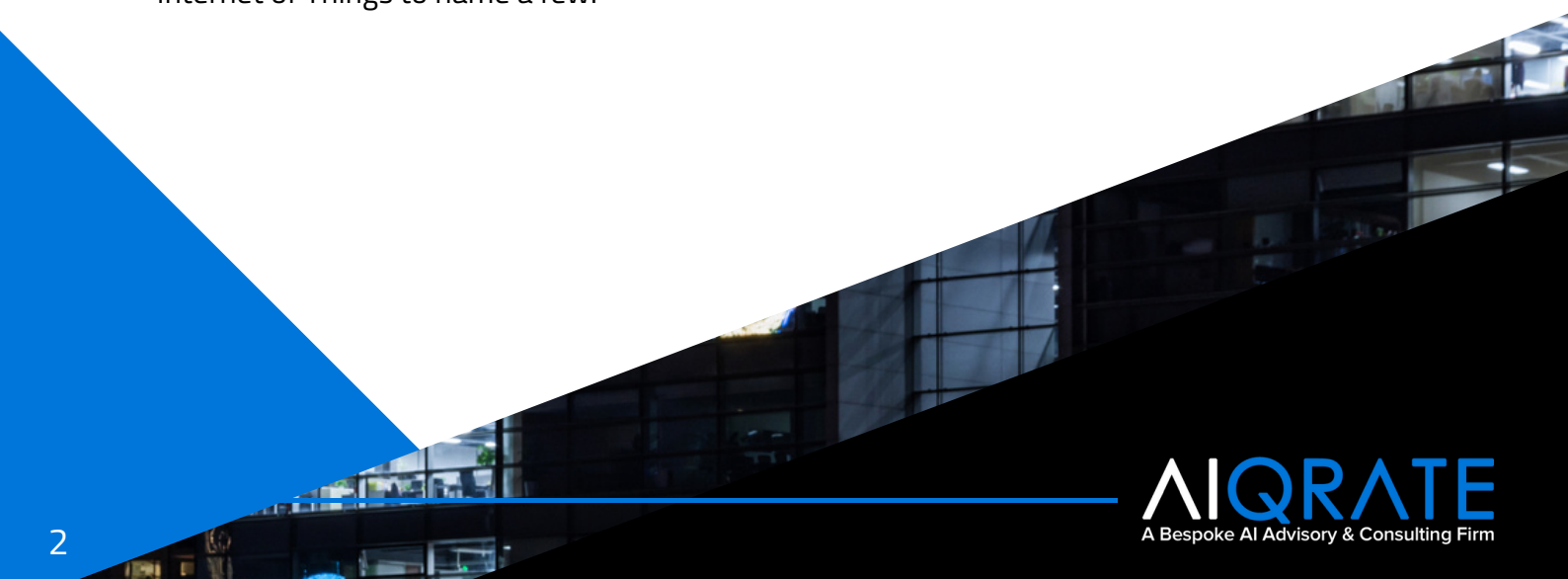
Artificial intelligence (AI) has been expanding applications from consumers to businesses, boosting productivity for stronger development. With massive accumulation of data, manufacturing has become a blue ocean market for AI adoption.

In 2019, AI met the Industrial Internet of Things and the use of artificial intelligence in the Industrial Industry began. Now a global transformation is underway to empower manufacturing with AI.

AI can locate and solve pain points in manufacturing and will have perceivable impacts on the entire industry over the next two to five years. The most critical pain points in production and operation facing manufacturing companies include rising costs, inflexible design of production lines, as well as unstable quality and yield of products.

AI can help businesses elevate process automation, formulate forecasts of market trends, schedule production, and improve the efficiency of inspections. AI will be a pivotal technology to drive growth and innovation in the manufacturing sector.

Life for industrial equipment manufacturers has never been more challenging. Globally, the sector is being impacted by multiple forces and trends. Not only must they deal with macroeconomic and political volatility, they must also adapt to an ever-changing cohort of disruptive digital technologies – predictive analytics, additive manufacturing, and the Industrial Internet of Things to name a few.



What's more, they must constantly reimagine how they function in the digital era, from creating a connected workforce to enabling predictive maintenance. And they must do all this amid the rise of industrial consumerism – where consumer-style expectations permeate every part of their value chains.

As the global manufacturing sector continues to be bombarded by a host of disruptive forces, manufacturers are under ever greater pressure to innovate and find new sources of growth. And now that artificial intelligence technologies are coming of age, they're demonstrating they can provide a much-needed productivity boost, as well as help in reducing operating costs and transform customer experiences.

Business Value Chain: AI Adoption Areas

1. Maintenance
2. Quality Control
3. Supply Chain Optimization
4. Design Process
5. Production
6. Demand Planning
7. Product Development/R&D
8. Process Control
9. Failure Probability Modelling
10. Price Forecasting
11. Customer Service
12. Yield Enhancement

1. Maintenance

For factories and industrial operations that are expected to run 24/7, equipment downtime can be a major operational challenge. Whether it's planned maintenance on a membrane in an industrial beverage plant or an emergency repair on a pipe in an oil well, operators need to be able to manage and react to equipment issues as fast as possible.

IoT sensors can monitor factors that affect equipment conditions across industries such as oil temperature, salinity levels, and vibration levels. IoT sensors can give operators critical insights into wear-and-tear as well as emergency issues, allowing them to shut down equipment to prevent catastrophic failure or take other appropriate actions.

2. Quality Control

In an increasingly competitive market, manufacturers cannot afford to waste resources on subpar products. AI algorithms can proactively identify mistakes and abnormalities that can occur at any time along the production process. There are business tasks that human workers will always be better suited for, but machines can be more appropriate to perform quality control tasks than manual inspectors are. Deep-learning-based systems can provide defect detection improvements up to 90% compared to a human inspector.

3. Supply Chain Optimization

AI's contributions to the manufacturing sector don't stop at the production line. Algorithms can help companies improve how they deliver their products to their consumers via predictive analytics. Better informed firms are able to shift from a reactionary model to a more profitable and predictive one. IoT sensors can collect a myriad of data along the industrial supply chain, from transportation and energy consumption to raw material cost fluctuations to weather patterns and other market conditions that can have an impact on a company's bottom line.

4. Design Process

While automation's benefits can be clearly observed on the factory floor, AI also is helping streamline and optimize the design process in manufacturing. For small and incremental improvements to a product's design, AI algorithms are able to explore millions of different tweaks and adjustments to a design to optimize its performance. Factors such as material usage and efficiency, structural strength, and weight can all be assessed and improved upon with AI algorithms.

5. Production

TAKT can be reduced by using AI to streamline manufacturing processes, improving throughput. For example, Mitsubishi Electric uses AI to automatically adjust rate, speed, acceleration, etc. of the industrial robots leading to the time reduction to 1/10th of conventional method.

6. Demand Planning

AI enables organizations to optimize product availability by decreasing out of stocks and spoilage. AI can also help with getting a better understanding of sales patterns.
For example, L'Oréal uses AI algorithms to predict demand based on a wide variety of data gathered from social media, weather, and financial markets.

7. Product Development/R&D

AI enables organizations to expediate product development and R&D by reducing the test times and driving more concrete insights from customer data and demands.
For example, Intel is using big data and AI platforms to create tests for hard to validate functionalities improving the targeted coverage by 230x as compared to standard regression tests.

8. Process Control

AI can help organizations optimize processes to achieve production levels with enhanced consistency, economy and safety.

For example, Unilever uses AI to influence operations by predicting outcomes and improving efficiency levels to optimise output.

9. Failure Probability Modelling

Failure probability modelling has won its place in the manufacturing industry. The efficiency of the machine learning algorithms in the failure prediction is undoubtful. Active application of failure probability modeling helps to increase performance, predict occasional failures in the functioning and as a result to reduce maintenance costs.

10. Price forecasting

To manufacture products, it is necessary to purchase the necessary resources, and sometimes the prices can get affected due to a number of factors. With the rapid changes in prices, sometimes it may be hard to assess when it's the best time to buy resources. Knowing the prices of resources is also necessary for companies to estimate the price of their product when it's ready to leave the factory. Using AI, the system is able to provide accurate price recommendations just like in the case of dynamic pricing that's used by e-commerce businesses like Amazon where machine learning algorithms analyze historical and competitive data to always offer competitive prices and make even more profit.

11. Customer service

In manufacturing, the importance of customer service is often overlooked – which is a mistake as lost customers can mean millions of dollars in lost sales. AI solutions can analyze the behaviours of customers to identify patterns and predict future outcomes.
For example, in 2018, Nokia unveiled the latest version of its Cognitive Analytics for Customer software, providing powerful new capabilities so service provider business, IT and engineering organizations can consistently deliver a superior real-time and personalized customer experience. The software allows service providers to quickly identify issues and prioritize improvements.

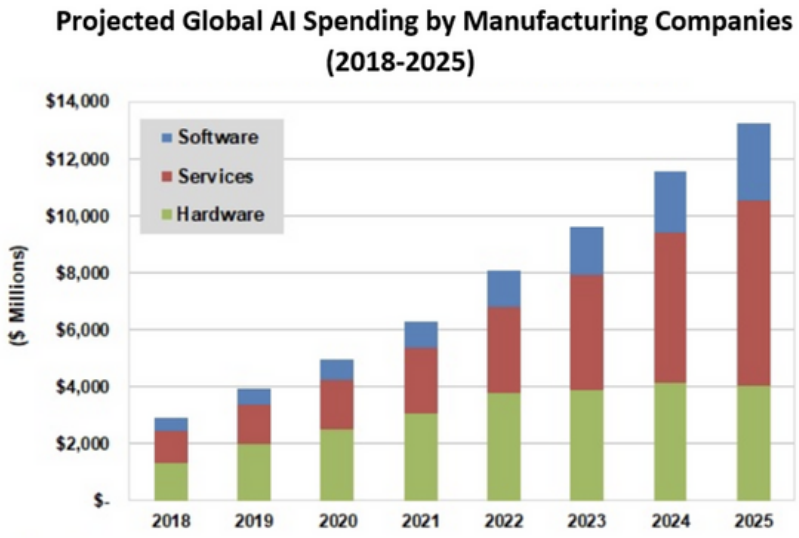
12. Yield enhancement

Manufacturers can now use AI systems to decrease scrap rates from defective products and get more value out of the materials that go into the production process. These gains are made possible by using AI systems to identify causes of yield losses that can be avoided by changes to production processes or product designs. The payoff can be huge. For example, in the semiconductor industry, decreasing scrap rates and testing costs can lead to a reduction in yield detraction of up to 30 percent of the total production cost.
programs and improve patient engagement.

Spending on AI

Global AI spending by Manufacturing Companies in the year 2021 is projected to reach $9.5 billion.

Annual worldwide manufacturing sector investment in AI software, hardware, and services is projected to increase to $13.2 billion by 2025 from $2.9 billion in 2018.



A few examples of spending & application of AI by Manufacturing companies on AI are given as follows: -

- **GENERAL MOTORS (US):** General Motors collaborated with Autodesk to implement generative design algorithms that rely on machine learning techniques to factor in design constraints and provides an optimized product design. Having constraint-optimizing logic within a CAD design environment helps GM attain the goal of rapid prototyping. Designers provide a definition of the functional requirements, materials, manufacturing methods and other constraints.

- **NOKIA (Finland):** Nokia has introduced a video application that uses machine learning to alert an assembly operator if there are inconsistencies in the production process. Nokia launched the video application that uses machine learning to monitor an assembly line process in one of its factories in Oulu, Finland.

- **UPTAKE (Chicago):** Uptake designs and develops enterprise AI software for many industries, including manufacturing. The artificial intelligence combines material, process and equipment data to offer suggestions on how to holistically improve the operations process. The AI specifically helps improve energy costs as well as optimize labour and product reliability.

- **VEO ROBOTICS (Waltham, Mass):** Veo Robotics combines 3D sensing, computer vision and AI to make robots safer to work with in a manufacturing setting without the need for cages or operations shut-downs to perform inspections. The company's AI constantly monitors a robot's surroundings and temporarily shuts down a bot if a nearby human or a malfunction is sensed.

- **MYTHIC (Austin, Texas):** Mythic is a creator of intelligent processing units (IPUs) for a slew of devices, including some in the manufacturing industry. The company wants to create IPU's powerful enough to let robots and drones communicate conversationally so they can respond and react to situations in real-time.

- **SIGHT MACHINE (San Francisco):** Manufacturers use Sight Machine's analytics platform to gain real-time insights into every part of their manufacturing process and optimize operations as a result. The Sight Machine platform culls information from multiple sources, analyzes it, creates a digital "twin" of a company's infrastructure and then highlights areas where operations can be improved.

- **INVISIBLE AI (San Francisco):** How it's using AI in manufacturing: Invisible AI's platform gives manufacturers real-time visibility into its operational practices. The company installs smart cameras in crucial factory areas to capture the movements of a businesses' workforce and study its operational functions. The AI then analyzes the footage and suggests ways to improve everything from staffing and safety to efficiency.

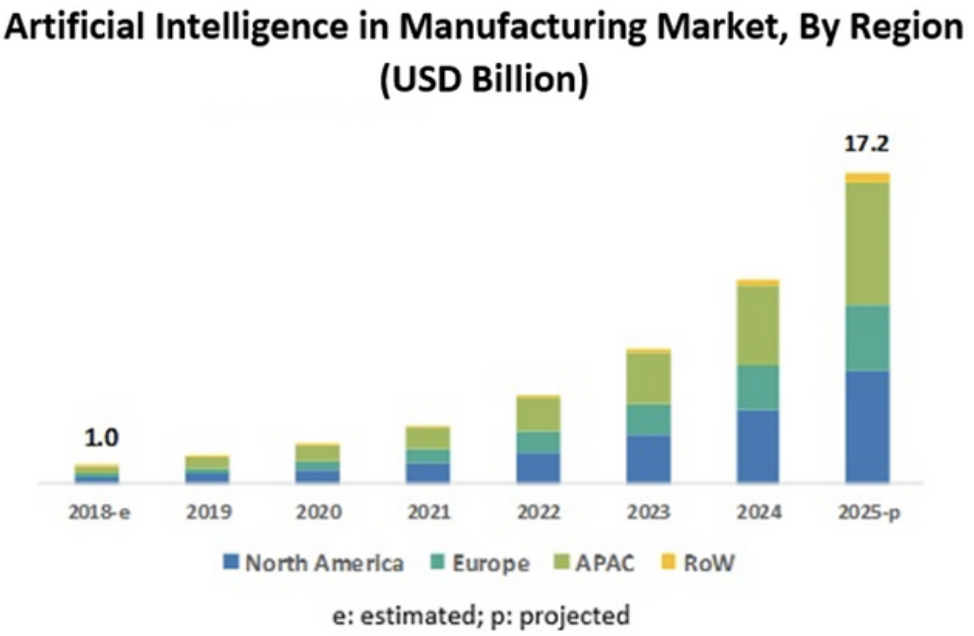
- **OQTON (San Francisco):** Oqton is building an AI-integrated open factory operating system. The cloud-based platform couples design requirements with hardware capabilities so it can recommend production instructions and machine combinations for optimal factory efficiency.

- **FERO LABS (New York):** Fero Labs is an industrial machine learning application that helps global brands optimize their manufacturing processes. The company's artificial intelligence can discover hidden factors that are hindering production, predict maintenance issues and even optimize energy usage.

- **LANDING AI (Palo Alto, California):** Landing AI creates customizable artificial intelligence-based platforms to solve manufacturing needs. The company's Landing Light platform collects and labels data, develops project objectives, performs predictive modelling and offers manufacturers continued support to maintain optimal levels of production.

As manufacturing becomes more cost-sensitive and customers demand quality, manufacturers are using AI to enhance the performance of equipment, reduce downtime, and improve the quantity and quality of products.

AI Adoption across Regions



- North America holds a significant share in the global artificial intelligence in manufacturing industry, and Asia-Pacific is projected to register the highest CAGR of 57.2% during the period 2020-2025, followed by North America.

- AI implementation can make robots smarter, reduce the downtime of machines, and increase the productivity.

- Hon Hai Precision Industry Co., Ltd (China) replaced 60,000 factory workers by robots.

- This high rate of adoption of industrial robots in manufacturing plants is expected to drive the growth of the AI in manufacturing market in APAC.

- The market growth is credited to the highly developed manufacturing plants in the countries such as Japan, South Korea, and China. The rapid adoption of the industry 4.0 revolution in the region also promotes the adoption of AI solutions. Moreover, the increasing investment in the AI technology in the emerging economies such as India and China are driving the market growth.

AI Adoption scenarios in this industry across US, Europe & Asia are explained as follows: -

AI Adoption across US

- **SPARKBEYOND**

Sparkbeyond is an AI-enabled research engine that detects patterns in complex datasets. It developed an AI manufacturing technology for helping manufacturers to get the data related to input such as text documents and geospatial, business data and information related to World Bank and, weather conditions. Using all this data, Sparkbeyond generates reports that assist manufacturers in making the best business and final decisions.

- **AUTOMATION ANYWHERE**

It is one of the biggest Automation companies and builds Robotic Process Automation (RPA) platforms for various industries. Manufacturing companies are using AI-enabled RPA platforms to automate the procurement, get insights, and manage and monitor the manufacturing processes efficiently.

- **BRIGHT MACHINES**

Bright Machines brings together intelligent software with flexible factory robots and machine learning to help our customers meet the growing demands of the next generation of manufacturing.

- **RETHINK ROBOTICS**

Rethink Robotics helps manufacturers meet the challenges of an agile economy with an integrated workforce, combining trainable, safe and cost-effective robots with skilled labour. Its Baxter robot, driven by Intera, an advanced software platform, gives world-class manufacturers and distributors in automotive, plastics, consumer goods, electronics and more, a workforce multiplier that optimizes labour.

- **OSPERITY**

Osperity's technology provides AI-driven intelligent visual monitoring for industrial operations that can result in improved safety, reduced carbon footprints, and more.

- **KINTA AI**

Kinta AI is an artificial intelligence platform which empowers the dynamic and digital factory of the future.

- **KUKA**

KUKA, the Chinese-owned German manufacturing company, is one of the world largest manufacturers of industrial robots in the world. One use case of AI they have been investing in is helping to improve human-robot collaboration. Most industrial robots were very strong and stupid, which meant getting near them while they worked was a major health hazard requiring safety barriers between people and machines.

- **CATERPILLAR**

Based on operation and performance data collected from shipboard sensors, Caterpillar's intelligent asset management system uses machine learning algorithms to optimize hull cleaning frequency by analysing cleaning cost and performance improvements under different levels of cleanliness.

AI Adoption across Europe

- **SIEMENS**

The German conglomerate Siemens has been using neural networks to monitor its steel plants and improve efficiencies for decades. The company claims that this practical experience has given it a leg up in developing AI for manufacturing and industrial applications.

- **CLOVER GROUP**

Clover Group develops predictive analytics platform for industrial companies. It makes predictions about the technical condition of equipment and the manufacture of defective products.

- **BRIDGESTONE**

Tyre manufacturer Bridgestone has introduced a new assembly system based around automated quality control, which resulted in more than 15 per cent improvement in uniformity of product.

- **PRESENSO**

The Presenso solution uses advanced Artificial Intelligence to provide real-time asset failure predictions based on monitoring sensors' signal data in the cloud. With its proprietary adaptive algorithms, Presenso can analyse sensor behaviour, automatically learn how machines behave and use this learning to predict machine failures before they occur.

- **KONUX**

The KONUX system is an end-to-end solution which uses IoT devices and artificial intelligence to improve network availability, extend asset lifetime and reduce costs. It continuously monitors and analyses the health of key switch components such as the track bed, and frog, and provides actionable recommendations. It ultimately allows for better maintenance planning by helping infrastructure managers anticipate failures before they happen and know the optimal time and type of maintenance needed.

AI Adoption across Asia

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- **FANUC**

Fanuc, the Japanese company, which is a leader in industrial robotics, has made a strong push for greater connectivity and AI usage within their equipment. Fanuc is using deep reinforcement learning to help some of its industrial robots' train themselves. They perform the same task repeatedly, learning each time until they achieve sufficient accuracy.

- **MITSUBISHI ELECTRIC**

Mitsubishi deploys multiple sensors and AI technologies on its industrial robots, allowing them to grasp targeted objects within 3.5 milliseconds and rapidly recognize and adapt to changing conditions while maintaining precise operations.

- **WEIQIAO TEXTILE**

Coupled with sensors installed on production assets, Weiqiao acquires and integrates all its textile workshop data, including machine operating data, product quality information, personnel information, equipment power, room temperature and humidity, etc., into a big data cloud platform for further analytics. This enables manufacturing system and data management on a fully automated textile production line.

- **AQUANT**

Aquant's predictive AI technology monitors equipment, aggregates data, and helps spot equipment failure before it happens. The company's systems operate across several verticals including Manufacturing, Life Sciences and Medical, HVAC, Communications, Computer and Office Equipment, and Home Appliances.

- **FLUTURA**

Flutura is an AI Solutions company focused on improving two core business objectives of "Asset Uptime" and "Operational Efficiency". Flutura does this with Cerebra, their AI Platform tuned for IIOT in Process Manufacturing, and Heavy machinery manufacturing industries, powering connected asset and connected operations use cases.

- North America possess high growth potential, due to increase in adoption of industrial robots in the manufacturing sector of the region
- North America is the major contributor in the AI in manufacturing market, wherein the US accounted for the largest share
- Cross-industry participation in the manufacturing domain, along with a significant increase in venture capital investment, has further propelled the growth of the Artificial Intelligence in manufacturing market in North America
- APAC to account for significant share followed by North America in Artificial Intelligence in manufacturing market during the period 2020-2025
- APAC is also considered to have the greatest number of manufacturing plants in the world. There are a few dark plants in China, where only robots work, and no human is required
- Europe AI in manufacturing market is anticipated to grow at a CAGR of over 44% over the period 2020-2025.

> **As a world manufacturing hub, Asia has great potential for industrial application of artificial intelligence. Among other countries, China, Japan, and South Korea who are more competitive regarding policies, research and development (R&D) capabilities, data, and talent are viewed as leading the way on AI development in Asia.**

Impact on Revenue and Cost

The Artificial Intelligence revenue in manufacturing market is expected to grow to USD 17.2 billion by 2025, at a CAGR of 49.5% during the period 2020-2025.

AI will add $3.7 trillion dollars revenue to the manufacturing industry by 2035.

- Increasing venture capital investments in AI are fostering growth of artificial intelligence in manufacturing market.
- Investments in the technology are led by tech giants and digital native companies including Google, Nvidia, and Intel.
- They are collectively investing massively in this industry in a wide variety of AI-based applications ranging from machine learning to robotics, assistance technology, and natural language to computer vision.
- The exponential growth in digital data is driving growth of artificial intelligence (AI) in manufacturing market. Today, it is estimated that approximately 1.7 megabytes of new data is created every second. It is further estimated to grow at an annual growth rate of 40% over the next 10 years.

Factors responsible for growth of AI in manufacturing market are:

- Huge availability of data sets and cloud storage solutions
- Increase in venture capital investments
- Evolving industrial IoT and automation is further supplementing the growth of the AI in manufacturing market.
- Widespread usage of machine vision cameras in manufacturing applications, such as machinery inspection, material movement, field service, and quality control drive the growth of the artificial intelligence in the manufacturing market.
- Moreover, key market players are adopting various strategies such as product launch and product innovation, to expand their existing product portfolio and maintain competitiveness in the rapidly growing AI marketspace.
- Oracle launched new artificial intelligence-based apps for supply chain, manufacturing, and other professionals. IBM launched AI-powered Watson Assistant for businesses. This product is a smart enterprise assistant powered with artificial intelligence (AI) features.

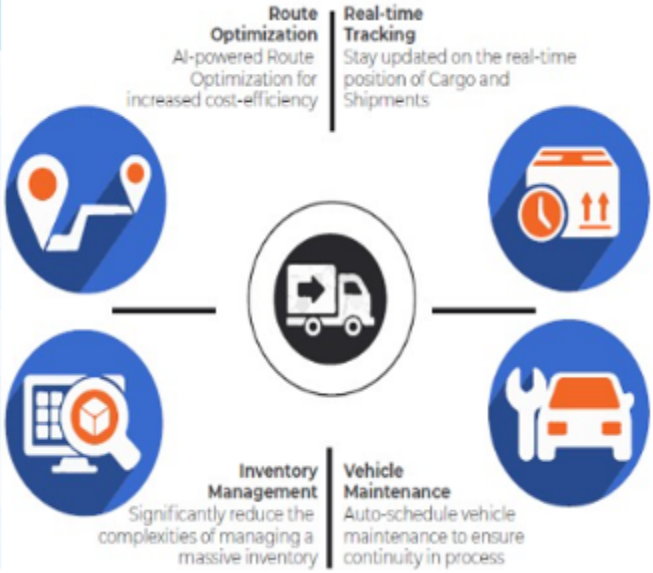
- GE launched Brilliant Manufacturing Suite to allow customers to realize their own vision of a Brilliant Factory.
- Furthermore, with the use of automation and AI in the manufacturing industry, risks during manufacturing processes are reduced and customers can get answers on an immediate basis, thereby enhancing the customer experience.

The extensive proliferation of advanced technologies, such as robotics and industrial IoT, in the manufacturing sector is the primary factor driving the market. The rising labour costs is also driving the adoption of advanced manufacturing technologies. The high investment by the major automakers to incorporate next-generation production technologies is also adding to market growth.

AI Use Cases in Manufacturing

Use cases in the Manufacturing Industry are given in the following diagram:

Application Scenarios	Tasks
Production Efficiency	Improvement of Equipment Flexibility
	Operations Scheduling & Labor Management
Quality Control	Automatic Detection
	Production Line Precision Enhancement
Facility Maintenance	Troubleshooting
	Maintenance Scheduling
Management System	Supply Chain Management
	Data Management



A few examples of top use cases in this industry are explained as follows: -

1. COMPANY – ASQUARED

USE CASE – Equilips 4.0: Sound analytics for real-time quality monitoring of manufacturing processes

a) PROBLEM

AI solutions for manufacturing plants

- SMEs face various network complexities to convert to smart manufacturing and become an Industry 4.0 compliant factory.
- Most of the available solutions are not easy to retrofit with old manufacturing plants.
- Real-time quality monitoring for "special processes" such as welding is extremely important to detect defects and easily fix them compared to fixing them at the end application.
- Destructive testing is the only known method to check the quality of welded joints, which is not only expensive but cannot be applied on 100% parts.

b) SOLUTION

Equilips 4.0, provides real-time quality monitoring of the welding process, requires no internet connection and other external connections

- Uses industrial sounds (sounds of machines) as the input/data and microphone as the sensor
- Developed machine learning (including deep learning) algorithms for Real-Time Sound Analytics that is embedded in the solution.

c) IMPACT

Sound analytics to deduce real-time information from manufacturing processes

- Non-intrusive, non-touch, easy to retrofit feature available on edge computing
- Huge savings from minimizing quality issues in the end application
- Visibility into the operations and quality from remote locations.

2. **COMPANY – FLUTURA**

USE CASE – Cerebra Quality Solution- Reliable Industrial Intelligence

a) PROBLEM

Need for stringent quality control

- The adhesives for critical mission usage needs stringent quality requirements from customers.
- Standard operating procedures not giving room for real-time interventions and quality control.
- Leading to over- production, rejections and customer complaints.

b) SOLUTION

Cerebra Quality solution a dynamic operating procedure using IoT Analytics

- IoT Analytics applied helped control quality of the finished goods not possible with standard operation procedure.
- Leverages technologies such as GPS, GIS, GSM, etc.
- Provides performance benchmarking and quality prediction through AI Apps.
- Conducts quality diagnostics using causal factor analysis.

c) IMPACT

High predictive accuracy and scale

- Achieved 95% accuracy in prediction of quality of finished goods
- Annual cost saving of USD 15-20 million across 10+ plants.
- Reduction of 12% in customer complaints
- Reduction of 60% in root cause analysis time
- 10% Off-spec reduction

3. **COMPANY – GENERAL ELECTRIC**

USE CASE – BOLTTM: A Digital Service Engineer, enhancing user experience & last mile productivity for field engineers

a) PROBLEM

Prolonged turnaround time in resolving an engineering (ER) case by field engineers

- Activities involving field inspection and analysis of equipments take up to one week of turnaround time.
- Providing recommendations to field engineers are extremely human centric & manual processes.
- Increase in down time of 'in service' assets

b) SOLUTION

BOLTTM, a platform which acts as a digital coworker to the engineering team resolving repetitive ER cases

- Converging digital with physical to improve industrial assets productivity
- Machine learning and data science models for exploratory, descriptive, predictive & prescriptive analysis aiding problem diagnosis and providing recommendations to engineering team
- Intelligent BOTS integrated with AI engine performs the resolution actions in tandem with engineering team
- Deep learning techniques and framework for image analysis and semantic understanding of words.

c) IMPACT

Reduce equipment down time leading to improved power output

- Reduces plant equipment down time to help improve power output generation, revenue and operating margins.
- Drives operational efficiency by reducing TAT time by 95%.
- Improvement in workforce productivity by 20%.

Challenges

The expectations are high for the application of artificial intelligence in manufacturing industry. Meeting the requirements is a real challenge to industrial partners. On the one hand training algorithms require lots of clean, bias free data sets, otherwise the result of the training would be wrong. On the other hand, cybersecurity is another threat that must be taken into consideration with the increasing use of connected technologies.

Some of the key challenges faced by the global manufacturing leaders in AI adoption are explained as follows:

1. Technology Gap
Many countries still face problems closing the technology gap between chip design and industrial software development for implementation of AI solutions in manufacturing. They must either import backbone digital products from foreign suppliers or build up their own tech capabilities, both of which can be costly and time consuming.

2. Data Scarcity
Machine learning models require a large high-quality dataset to train well-performing algorithms, yet some manufacturing processes still lack sufficient data for AI adoption.

3. Manufacturing Standard Variance
Manufacturing standards are different throughout the world, and this standard variance has become a major barrier to widespread AI deployment in the manufacturing industry.

4. Market Downturn
Compared with other industries, manufacturing has a relative low return on investment (ROI) and is less profitable in the short term. Consequently, many investors feel less confident about investing in new manufacturing technologies especially during a market downturn.

5. Data Inaccuracy
For machine learning to work properly, a lot of data is needed. Consumer data is easier to understand. However, when looking at the industrial internet, 40% of the data coming in is spurious and isn't useful. For instance, you need to calculate how far a combine needs to drill and you stick a moisture sensor into the ground to take important measurements. The readings can be skewed by extreme temperatures, accidental manhandling, hardware malfunctions, or even a worm that's been accidentally skewered by the device.

6. AI Runs on the Edge, Not on the Cloud

Industrial AI is built as an end-to-end system, where data is generated by sensors on the edge, served to algorithms, modelled on the cloud, and then moved back to the edge for implementation. In a manufacturing facility that crushes ores into platinum bars, bars that come out with the wrong consistency must be immediately detected in order to adjust the pressure at the beginning. Any delay means wasted material.

> **The benefits of using AI in the manufacturing sector are clear. Whether they lie in digitally focused innovation, enhancing user experience, bringing new levels of operational efficiency, or a completely new competitive edge, the technology holds huge potential for companies willing to make the jump to intelligent operations. But the risks and challenges ahead should not be underestimated. A balance must be struck between using human employees and AI-enabled machines, including a full consideration of the ethics of AI development.**

The Way Forward

For AI investments and strategies to remain competitive and differentiated, Manufacturing companies will have to move their thinking beyond short-term gains and in-house siloed deployment plans. Instead, they'll need to embrace a more holistic strategy based on identifying "best fit" AI partners, investing in AI strategy build along with broader ecosystem partnerships and collaborating efficiently within them. Rather than being tactical, limited to a single product line/plant/geo, these relationships will be strategic, focused on designing and implementing the AI technology path that the Manufacturing company needs to navigate.

Key steps for AI Adoption in this industry are:

1. Design AI Strategy
The first step in achieving scale involves designing AI strategy in conjunction with processing data in real time from the shop floor/production environment. To automate the collection of real-time, live data, the prototype needs to be integrated with legacy IT (MES and ERP) and industrial internet of things (IIoT) systems.

2. **Data Governance Strategy**
Put down solid foundations of data governance and AI talent to create a robust foundation for scale, and to encourage new implementations, manufacturers should design a data governance framework that defines critical processes related to the generation, management, and analysis of data. In addition, they need to deploy a data & AI platform – a central platform to store and analyse data using AI and to make it available to issue-specific AI applications.

3. Align with strategic objectives
Manufacturing companies need to ensure their AI deployments match their strategies and business goals, be that bringing new revenue, reducing costs, or enhancing operational efficiency. The key is to choose deployments of appropriate complexity to deliver business goals.

4. **Define use cases**
Ascertaining where a technology can outperform humans is the proper strategic approach to finding the right AI application scenarios.

5. Build data foundation
AI based on deep learning still relies on big data. A company's data foundations determine whether its AI project will work.

6. Establish teams and partnerships

If a company wants to develop AI capabilities, it needs a professional team with AI technology expertise, industry expertise and AI adoption expertise.

7. Run POC and implement at scale

After establishing a clearly defined scenario, complete data foundations, and a professional team, the next step is designing a prototype and running a proof of concept (POC) of the AI process. Iteration and large-scale implementation can be carried out if the prototype proves feasible. Performance needs to be continuously monitored for value generated, output quality and reliability.

> **The Manufacturing companies that take the lead in overcoming the challenges, and collaborate wisely with their wider ecosystems, are set to be the leaders of tomorrow. So far, the world has only seen a fraction of what AI has to offer. Manufacturing companies have barely scratched the surface of the potential and possibilities of Artificial Intelligence. That needs to change. It's time to make the leap to intelligent industrial manufacturing.**

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AIQRATE Advisory & Consulting

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AIQRATE works closely with Boards, CXOs and Senior leaders advising them on navigating their Analytics to AI journey with the art of possible or making them jumpstart to AI culture with AI@scale approach followed by consulting them on embedding AI as core to business strategy within business functions and augmenting the decision-making process with AI. We have proven bespoke AI advisory services to enable CXO's and Senior Leaders to curate & design building blocks of AI strategy, embed AI@scale interventions and create AI powered organizations.

AIQRATE's path breaking 50+ AI consulting frameworks, assessments, primers, toolkits and playbooks enable Indian & global enterprises, GCCs, Startups, SMBs, VC/PE firms, and Academic Institutions enhance business performance and accelerate decision making.

We have a proven AI advisory approach for enterprises, technology behemoths & platform players to enable CXOs and senior leaders to curate, design building blocks of AI strategy, embed AI @ scale interventions. We have collectively executed 3000+ AI / Analytics engagements across 350+ global clients for 14 industry segments and have built & scaled 100+ AI Center of Excellence. AIQRATE also provide advisory services to Technology companies, business consulting firms, GCCs, AI pure play outfits on curating discerning AI capabilities, solutions along with differentiated GTM and market development strategies for accomplishing high growth trajectory.

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