

# The Call of AI for Manufacturing, Plant Engineers & Plant Managers

How to create the best AI strategy today  
to see business success tomorrow

Artificial intelligence (AI) has an enormous potential to advance industries and change the way we work, live, and create. As one of the most exciting technological developments in recent years, AI is already a common part of modern life. It plays an important role in applications from self-driving cars to cancer diagnosis, automated financial market trading, and predictive maintenance.

The benefits AI brings to industry and business are no longer accessible exclusively to Fortune 500 companies. In fact, with the availability of open source platforms and the combination of advanced algorithms, computational power, parallel computing, and real-time data via the internet of things (IoT) and the industrial internet of things (IIoT), AI is quickly becoming an essential part of any successful business strategy.

In the very near future, AI will become critical to the ability of many organizations to compete and survive. Companies that fail to take full advantage of AI's power will find themselves vulnerable to competitors who will. Hence, many business leaders know they must act quickly to shift their organizations towards AI. Unfortunately, most do not know how to get started.

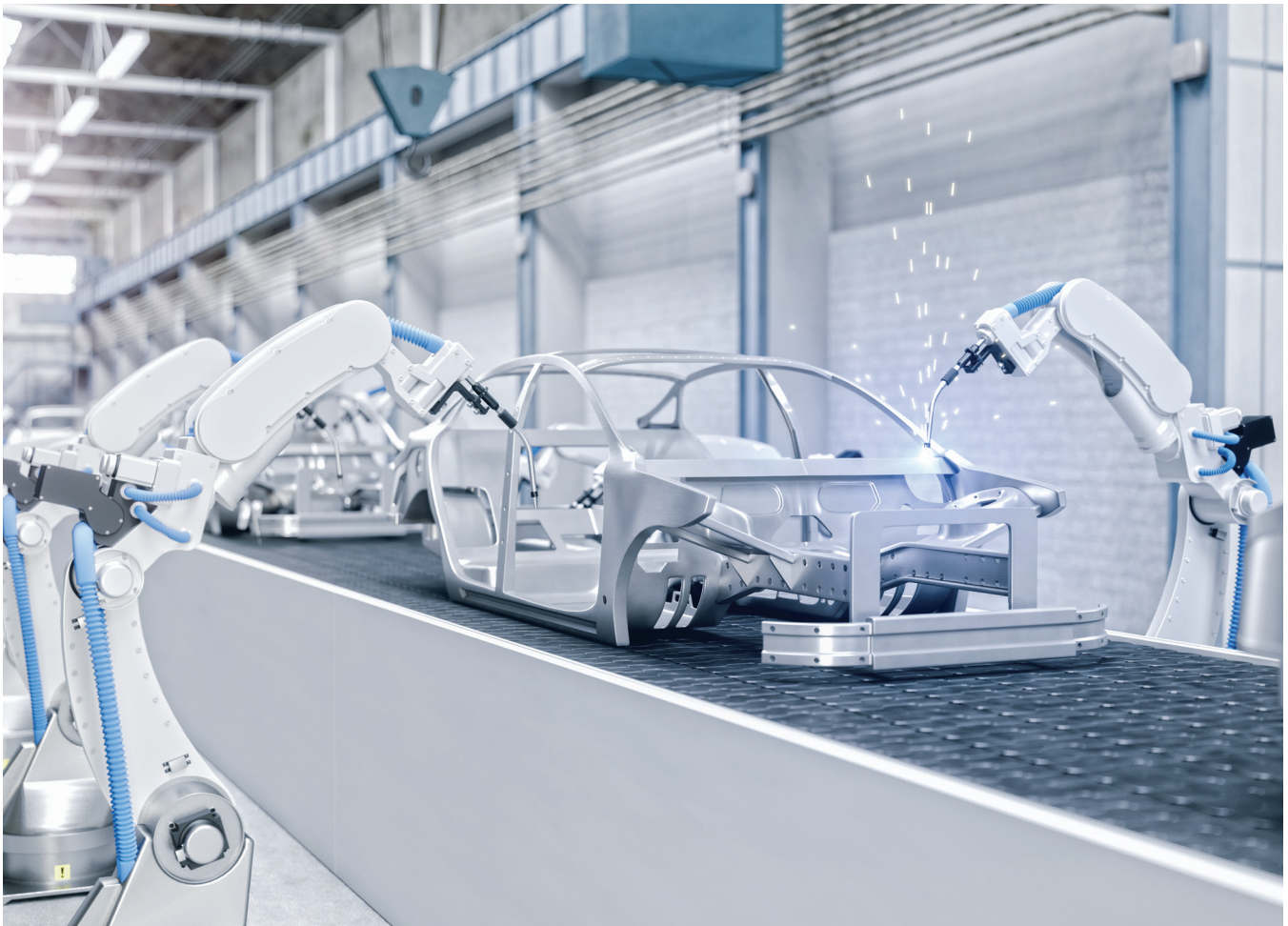
This paper unpacks the concepts and strategies that any company, large or small, should consider in making the move to AI. Learn about planning and implementation best practices; discover the value of having a knowledgeable AI partner; and gain a clearer understanding of how to embark on a successful AI path.

# The Draw of AI: Asset Health and Efficiency Gains; OEE and Yield Metrics Improvement; Quality Increase and Innovation

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AI continues to transform products, processes, operations, and customer interactions. Across all industries, AI learning patterns present significant opportunities to deliver value and gain a competitive edge. In engineering, in particular, AI has the potential to help avoid or prevent catastrophic failures.

AI can yield benefits in efficiency and quality, and pave the way to unprecedented or disruptive innovation, as well as lead to new and improved products, services, and processes. For example, in manufacturing, AI can help identify and correct process anomalies that would otherwise have a negative effect on quality. Manufacturers with high-volume and repetitive processes can improve the quality and efficiency of their overall production, and manufacturers of non-repetitive and unique components can use AI to achieve the best possible product.



# The AI Journey Roadmap: Business Goals and Corporate Strategy

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Before attempting to implement AI on a broad scale, organizations should take two steps critical for long-term AI success:

## 1. Identify AI business use cases and goals

Business goals, not AI technologies, must drive the AI roadmap. Leverage only those AI technologies that align with and serve the business goals throughout the company to increase overall efficiency.

- Starting at the executive level, as a top-down effort, establish reasonable business-oriented goals for implementing AI and the source of the use case business value
- For each business cases identified, estimate the value assuming the AI effort will be successful as well as the effort to get there
- Resist the urge to take on advanced projects that are too big at the onset, as the result will be wasted money, a lack of buy-in from employees, and the likelihood that meaningful and measurable results will be lost in the complexity
- Ensure the AI roadmap is sound and can produce meaningful results
- Expect some failures along the way, and capture the lessons learned

## 2. Establish a corporate AI strategy

Strategy helps AI become a cellular reality across the enterprise. Without strategy, AI remains, at best, a set of more-or-less successful projects.

Establishing a strategic AI roadmap requires:

- Understanding the business goals, why AI is the right technology to leverage, and how
- Understanding existing data gaps
- Understanding data infrastructure needed
- Establishing which processes must change

- Knowing which workflows the potential AI project will affect
- Ensuring full corporate buy-in to an established end game
- Specifying how everyone will participate
- Engaging key stakeholders and end users as early in the process as possible
- Harnessing the technology and related opportunities where revenue growth is possible, rather than to cut jobs
- Empowering existing employees by offering internal AI training or on-the-job retraining to accelerate the ability to deliver AI projects

## Start Small: Early Results Are Important

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Plan first to apply AI in small ways. Find early business challenges for which an AI approach makes sense and where existing data is good and has few gaps. Communicate the expected value to the organization to promote wider buy-in among other departments and projects. Once the organization has gained experience with small, easy AI projects, it will be possible to build on these successes with more complex challenges that offer even greater potential benefits. The end goal is enhanced accuracy, reliability and efficiency, and naturally, innovation.

# Choose the Right AI Partner

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A great deal of the hesitation organizations have about adopting AI stems from not knowing how to proceed. With the rapid pace of technological advancement, both in AI and IoT/IIoT, it is difficult for organizations to keep up. Understanding the challenges, pitfalls, and change management preparation required is critical. For any company, a great way to start addressing these challenges is to enlist the assistance of a solid and knowledgeable AI partner.

## Knowledgeable support

A knowledgeable AI partner will understand that AI technology is a tool for resolving pressing or future business issues and will:

- Coach the organization to focus on determining which problems must be solved now and which business objectives should be achieved over time
- Guide the organization through the initial steps critical for success by identifying:
  - » the important business issues to address with AI technologies
  - » the data model and data quantity/quality required
  - » the operational data infrastructure needed
  - » the appropriate tools and technologies
  - » the process to adapt
- Help the organization arrive at the best possible solutions, whether these involve basic machine learning or more complex deep learning algorithms

## The right fit

Look for an AI partner who approaches AI technologies in a logical, practical, and effective way. Evaluate potential AI partners and suppliers by asking these questions:

- Has the organization done this type of manufacturing or engineering project before?
- Can I speak to one of your customers?
- Will you perform an AI-readiness assessment at the onset?
- How do we start? What does the project look like? What can we expect in terms of timeline?
- Can you have a quick look at our data samples to see if this would be suitable to start? **Note:** If the supplier claims they will increase efficiency by a certain percent without looking at one of your data samples, strongly reconsider working with them.

## Blind spots

When an organization has trouble with AI implementation and strategy, the root cause is typically a lack of data knowledge. High-level engineers may have a good understanding of AI and machine learning but may not be aware of how far the technology has advanced, or they may not know whether their data represents a gold mine or completely biased datasets. Often, corporate leaders simply lack the data knowledge they need to progress effectively.

To succeed with an AI strategy, leaders must eliminate their data blind spots. A knowledgeable AI partner can help learning or struggling organizations eliminate these knowledge gaps.

# It's All About Data

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As many organizations understand that data plays a key role in AI, the primary concern when planning to implement an AI strategy is often to gather enough data and high quality data. Although it's true that the IoT and IIoT produce a staggering amount of data, that alone is not enough to get started. **Successfully launching AI, automation, and machine learning requires the *right* data, and *clean* data.** This is an especially important consideration if there is legacy data in the mix or manual manufacturing log entries to consider.

## Using the right data

Start by asking, “Do we have the **right** data to attain our business **goals**?”

- AI does not offer meaningful conclusions outright; it leverages data so that learning and self-correction take place over time, in pursuit of a specific business goal.

The next question should be, “How can we extract **actionable information** from **existing data**?”

- A wide gap may exist between the business applications of AI (the benefits automation can provide to help a company be more efficient and produce higher quality products) and the ability to innovate.

AI implementation involves early and ongoing efforts to get the most out of the available data and to maintain the value of the technology.

## Cleansing data

Data cleansing involves detecting, correcting, or removing corrupt or inaccurate records from a dataset. Data cleansing is one of the most important exercises as computational output cannot be trusted if the data itself is not trustworthy. AI and machine learning depend on high quality data-driven algorithms and decisions.

Early in the data cleansing process, expect to perform a data-focused exercise to detect outlier data. The best approaches use a high dimensional outlier detection algorithm rather than a manual process. The algorithm will improve the data ingestion process and become more efficient and valuable over time, and will be freeing employees to do their jobs instead of painstakingly clean datasets. Other tools to consider at this stage include AI readiness assessments, data quality assessments, and statistical analysis of the organization's data, as these have the potential to deliver highly valuable insights.

## Monitoring data

Organizations must plan to monitor the AI technology and the data fed to it with assessments, evaluations, and implementations, as well as consider the change management needs that go along with such an AI transformational undertaking. In this way, they can ensure that the technology is being used properly and evolving naturally. The solutions should stand both the test of time and the test of hectic operational realities.

# Plan for Change Management

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Corporate leaders who want to help their organization reap the benefits of AI should incorporate change management considerations in their AI strategy and solution. The assistance of a knowledgeable support partner early in the process can help leaders proactively manage employee expectations about their changing realities and ensure a smooth implementation of their AI strategy.

## Will AI replace employees with machines?

News about an organization's plans to adopt AI may meet with resistance and fear, especially if employees are concerned about layoffs and job loss. Leaders should ensure they provide employees with the training and support they need to adapt to new technologies.

A realistic reframing of the situation can help ease the concerns of employees and leaders alike. While AI implementation may eliminate some jobs, it will without doubt create new positions and opportunities. Most likely, as AI becomes a reality of the workplace, it will simply alter the concept of “work” to include closer partnerships between humans and automated workers.

## AI – Now & For the Future

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AI, machine learning, and deep learning will have a major impact on all companies in the near future. Successful implementation of this new technology cannot happen with a start-and-stop or piecemeal approach. Rather, success requires an unwavering commitment to harnessing the power of a broad set of possible solutions and algorithms. Organizations will be most able to reap the benefits of AI if they follow the guidance of experts who understand their specific needs and their industry.

Adopt a common-sense approach that builds on success over time and provides confidence in the process. Construct a clear AI roadmap that manages expectations and harnesses the data needed for AI magic to happen – and be careful to avoid the common trap of implementing “AI for everything.” Instead, learn how to gradually implement and capitalize on AI – now and for the future.



## Key Take-Aways

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- 1 AI is a powerful and accessible set of new technologies that organizations of all sizes can use to remain competitive
- 2 Start with business goals, strategy, and small wins
- 3 Find an AI partner with the right expertise to guide you on the path to AI and provide solutions tailored to your needs
- 4 Ask the right questions: It's not enough to have lots of data; you must have lots of the right data in support of your business goals
- 5 Understand data and eliminate blind spots; put in the work to prepare your data and plan the maintenance of your selected AI technology in operations
- 6 Don't underestimate the need for change management
- 7 With a strategic approach, you can benefit from AI now and in the future

## Definitions

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**Machine learning** is a subset of AI. It includes statistical techniques that enable machines to improve task performance based on experience. Machines receive data of different types from various sources and use it to learn how best to achieve the goals. Then, the algorithms can continuously learn to change their parameters as they gain more experience or data, or they can remain static, conforming only to the learned behavior and generalizing to unseen experience or data with more or less accuracy over time.

**Deep learning** is a subset of machine learning. It involves using a large class of algorithms, typically, when a large amount of data (hundreds of thousands or millions of samples) is available for training. Some optimization algorithms enable software to train itself to perform tasks by exposing multilayered neural networks to vast amounts of data.

Deep learning expands the capabilities of machine learning. Modeled after the neural networks of the human brain, algorithms learn from data exposure rather than from prior programming. Deep learning systems extract meaning from complex information, detect trends, identify patterns, and learn by example, without any prior knowledge. Deep learning tends largely to eliminate human intuition so that learning is based, instead, on the brute force and benefits of large numbers of examples and available data.

# About Maya HTT

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Maya HTT is the ideal AI partner for accelerating efficiency, quality, and innovation.

What sets Maya HTT apart is the team's ability to help their clients innovate without getting lost in the details of rapidly changing technology. Maya HTT delivers robust, lasting solutions and helps to put the right steps in place, so their clients can get where they want to go.

Maya HTT works hand-in-hand with some of the world's largest engineering and manufacturing companies where AI, machine learning and deep learning play an increasingly critical role. From product concept studies, design optimization, predictive engineering, and maintenance analysis to automation, real-time data acquisition, and analytics, or production planning and commissioning, Maya HTT delivers AI capabilities tailored to the unique challenges and requirements of each client.

Maya HTT brings valued expertise and skills to a range of industries. The services they provide range from design, programming, and integration to data analysis, technical support, and manufacturing automation. They can help with integrating different software or data sources, with product delivery, and even with connecting and bringing the right people together for a project. Rarely is one company able to offer such broad end-to-end capabilities and this level of depth.

With roots in the aerospace industry, where calculation mistakes have the potential to be catastrophic, Maya HTT is trusted and recognized for applying their specialized analysis and expertise to assist clients with the most critical operations.

Maya HTT's wealth of experience across disciplines differentiates it from other companies that can provide only some of the required knowledge. Maya HTT has the depth and breadth of expertise and experience needed to be an ideal AI partner for any organization.

