

# THE DIGITAL MANUFACTURER: A BLUEPRINT TO AI

**Artificial intelligence and machine learning are completely retooling the manufacturing sector. By harnessing their power to optimize every segment of your business, you can improve on the old way of doing things to achieve a better, safer, more profitable future. This blueprint will show you how to become a fully developed digital manufacturer.**

**PREDICTIVE MAINTENANCE**  
You can now predict the lifetime of factory components and machines, only conducting maintenance when it's needed, rather than according to use time or cycles.

**PREDICT PRODUCT QUALITY**  
Digital manufacturing can let you predict the future by determining if a product has a flaw early on in the process, so you can save time, money, and resources.

**DISASTER AVOIDANCE + HEALTH AND SAFETY**  
Digital manufacturers can use IoT and AI to monitor the shop floor for changing conditions and then flag dangers, saving time, money, and, potentially, lives.

**FORECASTING VARIABLE DEMAND**  
With digital manufacturing, you can prevent inadequate quantities or improper mixes, making variable demand much more manageable up and down the supply chain.

**REDUCE NEW PRODUCT TIME TO MARKET**  
AI tools can not only help design new products, but also optimize their manufacturing and reduce back and forth between design teams and those on the factory floor.

**COMPONENT KEY**  
These tools and process inputs are the key components that you'll need to harness in order to build a fully digital manufacturing future.

- Audio-visual processing** to harness images and sounds from the shop floor
- Collaborative software platforms** to allow everyone, from data scientists to plant managers, to work together
- Business intelligence** to better understand what happens outside the factory
- Enterprise resource planning systems** to track where things are and where they need to go
- Data warehouses** to source historical data that can be used in model training
- External data sources** to explore real-world factors like competitor products and weather
- IoT connectivity** to record and process data from your machines in real time
- Traceable product workflows** to help understand problems in quality
- Domain experts** to provide human insight for your machine learning systems
- Virtualization systems** to optimize your shop floor with insights from your models

**PREDICTIVE MAINTENANCE**  
**The old way**  
Manufacturers conduct inspections and maintenance on their machines based on usage or time in service, whether the machines actually need maintenance or not.  
**The better way**  
The digital manufacturer is able to predict the lifetime of factory components and machines, thereby reducing the frequency of failures or eliminating them entirely.

**DIGITAL TWIN**  
One of the best ways to optimize with predictive maintenance is to build a digital twin—a live, virtual representation of your workflows and processes. With a digital twin in place, you can adjust things virtually and let machine learning predict what the effects might be before you roll them out in reality, including their effects on equipment maintenance.

**BEER SUPPLIER**  
Beer demand varies with the weather, and making sure that you're producing sufficient supplies, while not producing so much that you can't sell it, often involves walking a tightrope. But with an AI system to forecast variable demand, you can not only make sure you're producing the right amount of beer at the right time, but also ensure that you have the inputs—like hops—on hand when you need them.

**FORECASTING VARIABLE DEMAND**  
**The old way**  
Set amounts of products are produced every week or every month, regardless of whether you're failing to meet demand or producing a surplus.  
**The better way**  
Digital manufacturers prevent inadequate quantities or improper mixes as well as limit revenue loss with machine learning. Forecasting with AI makes variability in demand much more manageable across the supply chain to ensure you have what you need, where you need it, when you need it.

**PREDICT PRODUCT QUALITY**  
**The old way**  
Defects are a fact of life in manufacturing. You do what you can do to reduce them, but some products are bound to have problems.  
**The better way**  
Digital manufacturers leverage AI to identify low quality products early in their creation, thus eliminating waste, ensuring high quality outputs, and reducing energy usage.

**WASTE ELIMINATION**  
Creating steel is a time- and labor-intensive process, and it's often apparent early on if a piece of steel will have to be discarded or recycled at the end of the process. By predicting product quality early on, processes can be adjusted, and sub-par steel can be recycled sooner rather than later, saving you time and money while reducing environmental impacts.

- Data warehouses** to store the historical data from IoT sensors
- Real-time IoT connectivity** to measure and record equipment states
- Domain experts** to understand the data, evaluate potential models, and adjust maintenance plans
- External data sources** to understand the impacts of things beyond your control—for example, economic indicators, competitor product launches, weather, etc.
- Business intelligence** to understand changing downstream needs
- Connectivity to enterprise resource planning systems** to monitor what goes in, what goes out, and what's in process
- Traceable product workflows** to help you understand where products have been so you can identify the source of defects
- Domain experts** to act quickly if low-quality products are being produced
- Data warehouses** to keep a historical record of all product quality tests
- IoT to monitor workflows** as they happen
- A collaborative software platform** to train models and run them on data

**REDUCE NEW PRODUCT TIME TO MARKET**  
**The old way**  
From product designers to workflow optimizations, a lot of manual back and forth goes into getting the manufacturing process for a new product ready.  
**The better way**  
AI tools can not only help with the design of a new product. They can also reduce the back and forth between designers and process engineers as they plan out how to manufacture and assemble the new product, speeding delivery to customers.

**VIRTUAL OPTIMIZER**  
Shop floor managers oversee a huge array of processes and flows, and have to make decisions quickly based on their extensive experience. Virtual optimizers are tools that make this easier—not only do they display the current status of various systems, but they can prescribe adjustments you can make to improve output—and even automate these adjustments.

- Data warehouses** to explore similar, past products to inform current models
- A collaborative software platform** to pull data from these sources and optimize the efficiency of producing the new product
- Virtualization systems** to understand how products will be assembled and how they'll be manufactured
- Business intelligence** to provide inputs on needed features and markets

**HEALTH & SAFETY**  
**The old way**  
An annual training, a few posters, and a stack of hardhats go a long way towards reducing the risk of disasters on the shop floor, but they're far from a guarantee.  
**The better way**  
IoT and AI come together to monitor changing conditions of various systems, but they can prescribe adjustments you can make to improve output—and even automate these adjustments.

**SAFETY GEAR MONITORING**  
One of the most surefire ways to prevent health and safety issues is to ensure that everyone is complying with established standards and protocols. But if you've got 100s of people working on the shop floor, how can you monitor all of them? AI tools that process video can help flag workers who, for example, aren't wearing appropriate protective gear so that you can ensure your procedures are being followed.

- IoT connectivity** to monitor various aspects of the shop floor
- Audio-visual processing** to monitor use of safety equipment and procedures
- A collaborative software platform** to process data and warn about possible issues
- Virtualization systems** to understand how products will be assembled and how they'll be manufactured