



**BUILDING THE FUTURE WITH  
MANUFACTURING ANALYTICS**

# TIME TO EVOLVE

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Manufacturing is an industry from a bygone era, and undergoing massive transformation today.

Modern manufacturing can trace its roots all the way back to the pre-industrial age when one person working at a loom could be relied upon to produce a set amount of cloth in a day and that was about the extent of measuring productivity. If someone could weave especially fast it was a big deal! Then steam power came along and suddenly measuring productivity was the sine qua non of all production, regardless of how conditions were for the workers or how dangerous and faulty the machines were. The entire industry was built on one operating principle: rapidly manufacture and ship new goods often at the expense of quality and safety. However, this outdated model isn't sufficient for today's increasingly changing standards of manufacturing.

Sheer output numbers only tell part of the story of manufacturing. Modern factory floors are filled with advanced machines, Internet of Things (IoT) sensors, robots, and other technology that generate billions of time-series data points. This data is critical to achieving operational efficiency. Only when married to other business-critical data do users gain a complete understanding of the entire supply chain.

This is where the biggest disconnect in modern manufacturing rears its head: many manufacturers are sitting on tons of data and aren't leveraging it to its full potential. Some companies don't know that they need an analytics strategy to transform the data into actionable insights into their business. Or else they understand the importance of analytics, but don't have the right analytics solution handle the variety and velocity of data generated on the factory floor and across their business. Lastly, with the high-tech nature of modern manufacturing equipment,

a lot of organizations could benefit from providing actionable insights at the machine sites. Many companies might not even know that this capability exists. Again: the application of modern analytics and BI technology can add a lot of value to manufacturing companies, whether they know it or not.

Another challenge facing the modern manufacturing industry includes a lack of understanding as to which key performance indicators (KPIs) are most important to track and analyze: some companies are overly concerned with simplistic metrics (output, production pace, etc.) and miss important elements, others could be focused on the wrong details entirely, just because they're trackable. Additionally, having too much information can cause people, even data professionals, to "miss the forest for the trees." Speaking of data professionals, manufacturing companies need to understand that these experts are vital to their success and that they need to be given the tools and freedom to build analytics solutions that will uncover insights and help them thrive in the hyper-competitive market.

All these factors taken together represent a challenge for a venerable industry and an opportunity to build a higher-performing and cost-efficient future with the right analytics solution. Let's take a look at why that is and what that can mean for manufacturing companies.

# ALL ABOUT ADOPTION

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Collecting tons of data is useless if you don't actually do something with it.

BI and analytics adoption in the manufacturing industry is low compared to other mature industries. An [IoT Analytics report](#) showed that only 30% of companies surveyed had completed analytics projects of any kind, even though a large percentage of companies reported having a data and analytics strategy. Most often, companies are gathering historical data from operational applications and using it for analysis and reporting with assistance from IT.

Within a given manufacturing company exist multiple departments, each with unique challenges and data needs. An IT-focused BI and analytics approach leaves the various departments competing for precious time from the technical resources, creating and causing the organization to be reactive versus proactive. Additionally, in this model, reporting (even future-focused analyses) tend to be outdated and less useful for decision makers trying to guide the company. Self-service BI solutions alleviate this problem, by empowering business users to perform ad-hoc analysis on their own without help from IT. This also frees up IT to focus on more value-driven activities for their team, laying the foundation for a stronger, more resilient data strategy (and company as a whole) down the line.

The ideal analytics solution for companies looking to ramp up adoption quickly will be easy to implement without special consultants or implementation teams. It also shouldn't tax the current IT team or require them to learn proprietary technology. Lastly, it should have a UI that's intuitive for non-technical teams to quickly adopt without relying on highly-skilled or technical resources, which will bottleneck the insights-gathering process.

# UNIFYING DISPARATE DATA

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An unfortunate consequence of the manufacturing industry's long history is that many established players (or new companies that learned how to do things based on outmoded ideas) are sitting on stores of data from incompatible systems. Even if they are performing analysis (which not all of them are), the results they are getting may only tell part of the story.

The main data divisions usually fall along two lines, with one set of systems for machine data (time series) and another for supply chain and distribution information. This can come from a variety of factors, linked back to the different teams that produce, monitor, and rely on that data, as well as how much of each given type of data is produced: Production roles are concerned with machine performance, requiring monitoring of large time series datasets. Business units are concerned with supply and demand, making sure orders are processed and delivered on time.

This is where a robust analytical solution can resolve this kind of mismatched reporting and give both teams and the whole company a fuller picture of the entire supply chain: with the right analytical tools, there's no need to choose between analyzing big time-series data and customer/order data. Modern BI tools are able to unify previously incompatible data into the same system, scale analysis to billions of rows, and still provide a granular level of detail for analysis. IT teams or other technical users no longer need to manually aggregate or segment data to compensate for performance issues.

# GETTING AN EDGE

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The sophistication of modern manufacturing equipment is a two-way street.

These complex, IoT-connected machines generate immense amounts of data every day. This data (as we've seen) can and must be used by teams to make business-critical decisions for the organization. However, humans aren't the only ones who can leverage the data to make decisions on a modern production floor. Indeed, even with modern BI systems in place, waiting for a human to interpret the reporting and analysis once the numbers have been crunched could be too long for actual impact. Instead, this latest generation of advanced machines can and should be empowered to make decisions for themselves.

This new paradigm is called "edge analytics." The edge, in this case, refers to the point at which the action (manufacturing) is taking place. Since IoT machine data is being created at every step of the manufacturing process, being able to quickly analyze this data on-device and drive real-time insights is a critical need for modern manufacturers looking for an edge in a highly competitive space. The ability to have machines understand their own data and take action is becoming instrumental to further optimizing operations.

However, handling these huge amounts of data quickly at the edge was impossible, until recent the rise of innovations like Deep Neural Nets small enough to install and provide insights at the edge. Now smart machines are even smarter. The ability to rapidly crunch massive amounts of data and make optimization decisions, without human interaction, isn't just possible, it's a game-changing reality.



# KNOW YOUR KPIS

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One drawback to having a huge store of data at your disposal is analysis paralysis: companies can have so much data that they don't know where to start with it or which performance indicators are most important. Or, if a company has started analyzing some of its data, it may be looking at the wrong KPIs and end up with reports and dashboards that miss the mark and ultimately don't have the business impact the organization wants. Here's a quick rundown of some of the most important KPIs for BI-focused manufacturing companies:



## Manufacturing Cycle Time:

As the name implies, this is a measure of the manufacturing speed from order to production to finished goods. A robust BI solution will be able to mashup data from the ordering platform, production hardware, supply chain, and CRM in flexible data models. This creates visibility into the ordering, manufacturing, and distribution processes in one place. Different data doesn't have to be siloed in different systems or bottlenecked by complex data modeling.



## Throughput and Overall Equipment Effectiveness:

Machine efficiency is paramount for most manufacturing companies. Streaming live machine data into analyst models and business dashboards with a BI solution allows end-users to set alerts and analyze full-lifecycle efficiency, easily and in one place. Additionally, DNNs can also bring the insights from terabytes of data to the edge, right at the machine location.



## Ensuring Compliance:

Manufacturing companies face a variety of health, safety, and environmental risks, so tracking these mishaps and other noncompliance events is a vital HR task. It has ramifications not just for the company's bottom line, but for the frontline workers in the facilities themselves, without which the organization cannot function. With proper BI software, a variety of HR metrics, from incident reporting to performance tracking, can be managed in a single stack. The HR team can also analyze incidents alongside machine data to learn if specific production areas or machinery are more dangerous or they can mashup personnel data with environmental factors to make sure that facilities are meeting environmental safety standards.



## Inventory Optimization:

These metrics deal with tracking efficient use of inventory supply vs production and doing cost analyses. Users will be able to view and analyze inventory levels, usage, and ordering needs. They can create forecasts for expected orders and optimize production to delivery times. The ability to combine and drill into multiple data sources together helps planners understand supply chain bottlenecks and speed up time-to-delivery.



## Increasing Profitability

The ultimate goal of any company is to become more profitable. The right manufacturing analytics solution will combine supply chain analysis and manufacturing cost as a percentage of revenue and help the company perfect their order percentage. Users can view and analyze inventory levels, usage, and ordering needs, then use this info to create forecasts for expected orders and optimize production to delivery times. They'll also be able to drill into multiple data sources together in one place.

# KNOW YOUR BUILDERS

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Manufacturing is all about building new things, but some of the most important builders at a company don't create its commodity products. They're the people responsible for building the dashboards and other utilities (apps, embedded analytics, etc) that allow the company to unleash the full power of the data at their disposal via a BI solution. Three vital builders who need support and resources to get the most out of an analytics software system are Data Engineers, the Head of BI/Analytics (if there is one), and Business Operations Users. Let's run through their challenges and what the right BI solution can do for them:



## Data Engineers:

These experts are the backbone of your data and analytics strategy. They know your systems inside and out and will be the frontline workers getting the BI solution up and running and building the dashboards and analytics apps or embedded solutions that will help users throughout the company (and even your customers) get the most out of the analytics you have to offer. They need to manage and monitor large time-series machinery data, but can be stuck dealing with slow legacy systems. They also understand the pain of connecting to multiple data sources: they govern machine data, business data, supply chain and inventory data, and internal data. Making big time-series data real-time and accessible to business teams will be another one of their challenges. However, with the right solution, they'll be able to work with large data volumes directly from your data warehouse and mashup models from different sources. It will also allow them to go from large complex data to analytics without long implementation cycles or ongoing consultants and scale data and users even as production and hardware grow. Giving this crop of builders the keys to a robust analytics platform will empower them to create efficient, effective analytics that the entire company can use.



## Head of BI/Analytics:

This person usually runs point for the overall data strategy and is responsible for getting software and a team in place. Their biggest concerns are being able to quickly and automatically report production problems to business teams for compliance. It's time- and cost-intensive to combine machine data and web data into dashboards for end users and legacy platforms require a lot of back and forth between data engineers and analysts (and not all modern data-discovery tools can handle machine data volumes). A savvy Head of BI will want an AI-enabled system that can create threshold alerts and deliver critical information via email, app, phone, or smart device to the team members who need to know what's going on. They'll also want a solution that eliminates the need for back and forth between IT and business analysts for modeling data.



## Business Operations User:

If Data Engineers are the frontline workers for building the overall analytics solution and utilities, then Business Operations Users are the frontline workers using those embedded analytics and building dashboards to make critical business decisions. They want to have data visibility into the order-production-delivery lifecycle. They also want to manage and optimize the company's supply chain, which is difficult without a powerful BI tool that can mashup disparate datasets. They, too, need a solution that will keep them from having to go back to analysts (or worse, back to the data or hardware engineer) to answer new questions from the same data. A single-stack solution that can unite data from both IoT devices and business sources to create a full picture of supply chain management and performance is ideal for their needs. They'll want to be able to deal with data from every source via one easy-to-use UI, without going back to IT or engineers when requirements change.

# WRAPPING UP

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Manufacturing might be an industry with a venerable history, but technological advances leave no market behind. Every company is forced to adapt or die.

With the massive amounts of data that manufacturing companies generate daily, from IoT machines to legacy systems filled with old-school accounting and supply-chain data, only a BI strategy and solution will allow them to remain competitive and excel. The right solution will mashup disparate data types and sources, provide insights via an easy-to-use interface, and facilitate the creation of custom utilities to empower users of all kinds. Now get out there and build the manufacturing company of the future, with analytics and data!

See how Sisense helps manufacturing companies

