TCG DIGITAL

WHITEPAPER

Manufacturing:
Analytics unleashes profitability
-- pushing productivity to the max

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1. Building the Future with Manufacturing Analytics

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 if someone could weave fast it was a big deal! Then steam power came along and suddenly measuring productivity was the sine qua non of all production: 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 However, this outdated model isn't sufficient for today's increasingly changing standards of manufacturing.

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 which when married to other business-critical data give users a complete understanding of the entire supply chain. However, some companies don't know how to leverage this, or that they need an analytics strategy to transform the data into actionable insights. Some understand the importance of analytics, but don't have the right analytics solution to 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 insights at the machine sites. One big challenge is the lack of understanding of key performance indicators (KPIs) to track and analyse.

A common definition of business analytics is the use of data, information technology, statistical analysis, quantitative methods, and mathematical or computer-based models so that managers gain improved insights about their business operations and make better, fact-based decisions.

1.1 All about Adoption

BI and analytics adoption in the manufacturing industry is low compared to other mature industries.

An ideal model of BI adoption would be using self-service BI solutions that empowering business users to perform ad-hoc analysis on their own without help from IT, thereby freeing IT to focus on more value-driven activities. Moreover, it should have a UI that's intuitive for non-technical teams to quickly adopt without relying on technical resources.

1.2 Unifying Disparate Data

An unfortunate consequence of the manufacturing industry's long history is that many established or newer players are sitting on stores of data from incompatible systems which don't deliver the desired insights.

The main data divisions usually fall along two lines: machine data (time series) and supply chain and distribution information generated from a variety of factors, linked back to the different teams that produce, monitor, and rely on that data, as well as the volume of each data type produced. Modern BI tools are able to unify incompatible data into the same system, scale analysis to billions of rows, and provide a granular level of detail for analysis.

Connect Disparate Data

Unify all your data sources into one data management system for a full picture of the entire manufacturing lifecycle.

Easily Adopt Across the Entire Company

Powerful and fully-featured UI makes analyzing insight intuitive and familiar.

Deliver Insights at the Edge

Condense immense amount of data into a lightweight neural network for analyzing and delivering insight at the edge.

Connect Operations with Industrial IoT

Accelerate the time it takes to connect, mashup, and analyze data across sensors, devices, and business system, delivering insights into operational and business KPIs.

Connect with Supply Chain and Logistics

Connect directly to internal sysytems (ERP, MES, etc.) to mashup external partners' data and get complete visibility across your supply chain.

Strealine Sales and Operations Planning

Mashup data around customer behavior, sales, and forecasting to make adjustments and maximize revenue.

1.3 Getting an Edge

There is a new paradigm 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 analyse this data on-device and drive real-time insights is a critical need to gain an edge in a highly competitive space.

Sensors, smart technology, and other connected devices would not be effective if their entire data analysis process involved sending back information to a central location and waiting for it to be processed and returned. Instead, edge analytics optimizes the process by handling the bulk of analysis on-site, usually in a nearby connected network switch or device, and only transmitting the most important data back to a central server, thereby providing real-time or as close to real-time BI insights and a scalable analytics system.

1.4 *Know Your KPIs*

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 begin or which performance indicators to consider. If a company has started analysing 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:

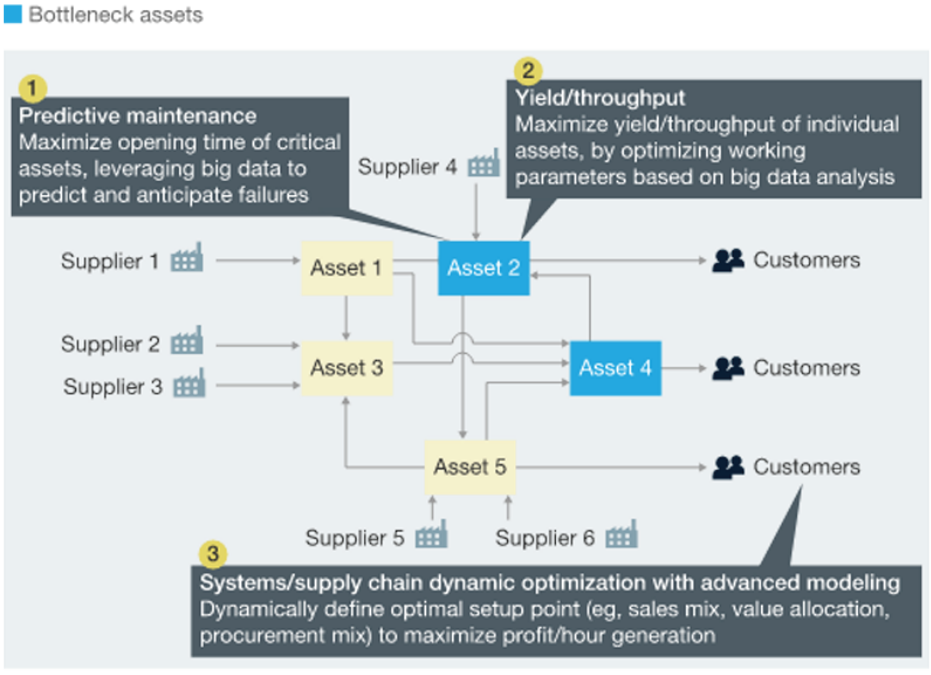
Manufacturing Cycle Time:
As the name implies, this is a measure of the manufacturing speed from order to production to finished goods. A robust BI solution will be able to mashup data from the ordering platform, production hardware, supply chain, and CRM in flexible data models.

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 analyse full-lifecycle efficiency. Additionally, DNNs can also bring the insights from terabytes of data to the edge, right at the machine location.

Advanced analytics also help manufacturers solve previously impenetrable and unknown problems, such as hidden bottlenecks or unprofitable production lines.

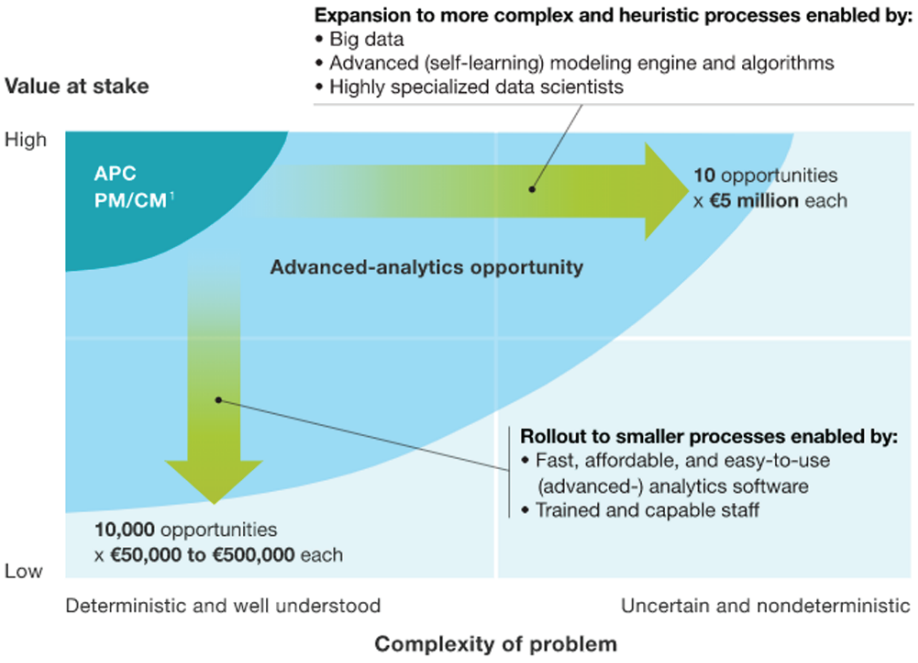
Together, these advanced analytics approaches can deliver EBITDA (earnings before interest, taxes, depreciation, and amortization) margin improvements and boost ongoing efforts for increasing productivity, through better management of production systems and optimal reallocation of resources in real time.

Advanced analytics maximizes operations performance through three main applications.



McKinsey&Company

Optimizing production is now realistic for smaller and unstructured manufacturing processes.



[1]APC = advanced process control, PM = preventive maintenance, CM = condition-based maintenance.

1.5 Decreasing downtime in an always-on world

Machines break. With more (and more expensive) machinery to keep track of, continued pressure to increase uptime and productivity, and growing demand for flexible operations, manufacturers need to leverage big data to anticipate their failure. Using advanced analytics, companies can determine the circumstances that cause a machine to break and monitor input parameters so they can intervene before breakage happens, thus minimizing downtime. Predictive maintenance typically reduces machine downtime by 30 to 50 percent and increases machine life by 20 to 40 percent.

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. With proper BI software, a variety of HR metrics, from incident reporting to performance tracking, can be managed in a single stack for better environmental safety standards.

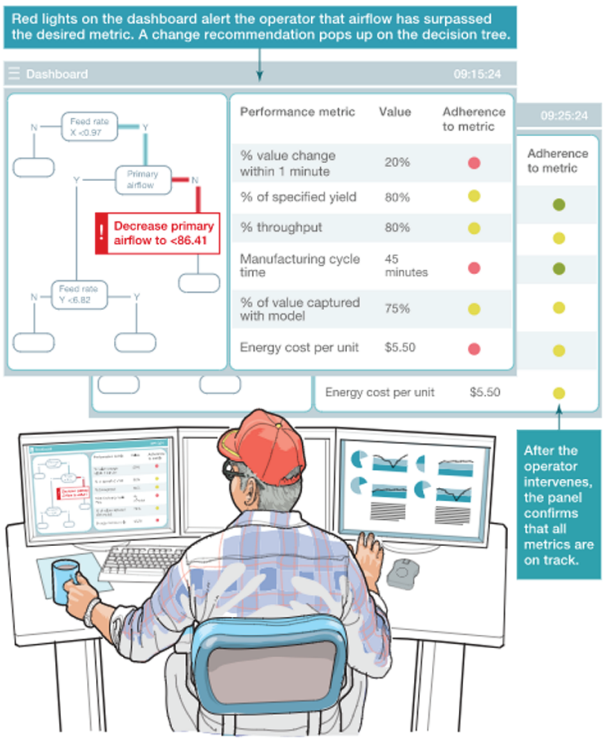
Inventory Optimization:

These metrics deal with tracking efficient use of inventory supply vs production and doing cost analyses. Users will be able to view and analyse inventory levels, usage, and ordering needs. They can create forecasts for expected orders, optimize production to delivery times, understand supply chain bottlenecks and speed up time-to-delivery.

Increasing Profitability:

The ultimate goal of any company is to improve profits. The right manufacturing analytics solution will combine supply chain analysis and manufacturing cost as a percentage of revenue.

Using data captured from sensors, along with advanced-analytics tools, patterns emerging on where costs, heat levels, recovery levels, and other variables are deviating from predicted values, can be closely analysed. Operators can then fine-tune process procedures or inputs to eliminate losses in the day when profitability falls below optimum levels. The insights allow managers time to make the necessary trade-offs.



As displayed in the example above, the unified metric has allowed full tracking of costs. Variations in efficiency, previously likely to continue for days, are eliminated within hours on average thanks to new ways of working across the facility. Costs have fallen by 8 percent in the two years since the new profit standard was adopted, and, coupled with other improvement initiatives, it has resulted to an $80 million cumulative increase in earnings.

1.6 Exploring new horizons

With rapid adoption of process sensors and greater capture of data, artificial intelligence (AI) is likely to figure prominently in the next wave of gains. Analytics models will “learn” from process variations and make adjustments automatically. Models learn from historical data such as temperature, power consumption, and the functioning of cooling systems. They use that information to understand variations in data-centre operating conditions and “judge” how best to run cooling systems with minimum power use.

Further, profit per hour can be applied across multiple company manufacturing sites and more broadly to supply-chain networks and customers. A more accurate, real-time view can help companies understand how to optimize the supply routes to a given finished product, how to most profitably serve customers when several production sites exist, how many products to manufacture from a single production site, and the best combination of make-versus-buy options for better “post-mortem” analysis of value leakage across operations, and simulate the forward impact of strategic decisions. As the quality of IT and analytic skills improves across sectors, and as managers learn to accelerate frontline adoption, productivity levels are likely to increase in a wide range of economic activities.

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Amithaba has over 20 years of experience in technology and strategic consulting. Both on the technology as well as the digital strategy side, he has run transformation projects with Fortune 100 companies in geographies like US, Canada, UK, and Singapore. Amitabha started his career with IBM Watson Lab and has 5 patents with IBM. Thereafter, he worked for consulting majors like PwC (UK) and EY (US) and has run large BFSI ODCs based out of Singapore and Hong Kong.

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