



Analytics in Manufacturing

Manufacturing has long been the bedrock of the world's economy. From the moment that Oliver Evans built his first automatic flour mill in 1785, inventive engineers have been standing on the shoulders of giants to compound information and improve designs. The inception of interchangeable parts, accomplished by Eli Whitney around 1801, was a huge breakthrough. Manufacturing became faster and much more efficient, allowing businesses to improve cash flow and increase profits.

Enter the modern age and manufacturing analytics. This development is as important to production as those that came before, because analytics are the key to pivoting in the right direction, eliminating inefficiencies, and nurturing growth. In this paper, we'll look at the application of analytics to three areas of critical importance: production forecasting, predictive maintenance, and quality assurance.

Production Forecasting

In the past, forecasting was a little bit of math and magic, and a lot of guesswork. The advent of Just-In-Time (JIT) processes as a reaction to inventory taxes made production forecasting more of a necessity than a luxury, and the ability to create accurate forecasts a highly valuable skill. JIT needs fuel to power it, and data from forecasting is its favorite food.

Relying on historical purchase data to create forecasts is a start, but customers don't always follow the same purchase patterns every year. What if we could incorporate Customer Relationship Management (CRM) data, so that pending deals could be included in forecasting based on the likelihood of closing? What if we could test macroeconomic data like the Consumer Price Index or hiring trends to see if those are leading indicators for demand? Or what if weather patterns have a predictable effect on sales?

Adding so many variables to the mix sounds a little terrifying at first. However, all of these data are reliable predictors for different industries, and whether or not they are relevant to a particular company's products can be determined through analysis. Once you reap the benefits of more accurate forecasting, you will see that educating yourself on these methods is well worth it.

Predictive Maintenance

Preventive maintenance is a long-lived industry standard used to keep production lines going and avoid downtime. Unfortunately, replacing parts on a set schedule is unscientific at best. What if the part didn't actually need replacing? Surely there's a more accurate way to determine timetables for parts replacement and prevent an outage.

The concept of the Internet of Things (IoT) comes into play here. By networking sensor devices to a centralized management system, businesses can monitor performance in real time and over the life of the asset. Sensors for various measurements are available, including:

- **Thermal Imaging** - In a predictive maintenance environment, thermal imaging uses infrared technology to collect heat maps of equipment so hot spots can be detected. Heat is often generated by components in a system that are failing.
- **Vibration Analysis** - Vibration analysis uses onboard monitors or hand held devices to track the vibrations of machinery. Wear causes different vibration patterns that can be too subtle to hear as sound. Comparing the data against known failure points can help

"Predictive, on the other hand, is uber-profitable. We can have a very clear view if we gather information from smart instruments. We can optimize OpEx, and minimize unplanned downtime."

Jamie Stapleton,
Schneider Electric

technicians identify where the problem lies before total failure.

- Oil Analysis - You can learn a lot about how your system is functioning by examining the oil for particles and liquids. This practice draws quick attention to outside fluid leaks and wear on metal components of the system.
- Emission Testing - Much like oil analysis, testing the composition of emission gasses can provide a wealth of information about the functionality of your systems.

Quality Assurance

Sure, all of this data collection and analysis helps cut costs when it comes to the health of a manufacturing system, but the benefits go deeper than that. Measuring multiple different inputs to the production process can bring surprising insights. Factors once thought to have no impact might turn out to be small influencers after all, and tuning their combined effect can produce double-digit gains in efficiency or yield.

Can't My Current Systems Do This?

In a word, no. Systems in use at manufacturers, like MES and EMI, are built to

manage manufacturing processes. They generate plenty of data, but unfortunately they are not design to retain massive amounts of it, nor to analyze it in a strategic manner.



Why Brilliant Data?

You can develop solutions in-house, but it's a steep learning curve. Here at Brilliant Data, we're recognized experts in leading Big Data technologies like Hadoop, Spark, and machine learning. We're committed to helping our clients not only deploy these advanced technologies, but understand them and be able to realize their full potential.

Brilliant Data has deep expertise gained from working in some of the world's most demanding IT environments. Our people have built sophisticated solutions that have helped our Fortune 500 clients and mid-market leaders alike, begin gathering and analyzing data in ways they had never dreamed of!

If you'd like to contact us to discuss your next project, drop us a line at info@brilliantdata.net

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