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Gaining Competitive Edge in Manufacturing with Big Data

By Daron Gifford, Partner & Management Consulting, Strategy & Automotive Industry Consulting, and Doug Hockenbrocht, Partner & Management Consulting, Plante Moran

For more than 20 years, manufacturing industry buzz has focused on "lean manufacturing," a production approach first launched by Toyota Motor Company in Japan, then publicized in the United States during the early 1990s. With an underlying goal of "making the vehicles ordered by customers in the quickest and most efficient way," Toyota sought "the complete elimination of all waste"— an ever elusive target, given the 30,000 or so parts on average that Toyotaand a global supply chain subject to myriad crises and disruptions, including natural disasters, political unrest, and institutional failures.

Over the past two decades as technology has evolved, aspiration is now yielding to reality, as big data and predictive analytics revolutionize the manufacturing industry.The speed of change is rapidly accelerating, where digital information is now measured in zeta-, exa- and petabytes (1 zb = 1,000 eb = 1 million pb = 1 trillion gigabytes), actionable insights that, when leveraged properly, provide capabilities to dramatically improve the manufacturing process.

Just how much information is out there to be harnessed? "It is estimated that Walmart collects more than 2.5 petabytes of data every hour from its customer transactions," writes the Harvard Business Review, "the equivalent of about 20 million filing cabinets' worth of text," a number that it expects to double every three or four years.

That volume of information is not restricted to mega-retailers and their point of sale systems. Indeed, advanced manufacturing technology allows 24/7 monitoring and access toproducts, customers, suppliers, equipment, and processes…real-time insights that help maximize productivity and efficiency. The result: leaner manufacturing.

A more intensive, analytics-driven approach can be applied to increase throughput, improve quality, and exploit efficiencies in nearly every phase of manufacturing operations, including:

▶ Shop floor integration. Whether designed to bend, cut, or form parts, today's manufacturing equipment is integrated with software capable of capturing a variety of valuable information, such as the number of parts that are produced, mechanical downtime, and maintenance schedules.

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While such software may vary among machines, integrated ERP-oriented software packages can synchronize communications, capturing data from each machine and displaying it in a way that allows better-informed decision-making. For instance, an integrated maintenance module can be programmed to send an alert whenever a piece of equipment goes down, instantaneous feedback that helps minimize disruptions and improve plant utilization.

▶ Human resource integration. HR data extends well beyond mere time and attendance tabulations, providing insights that allow a supervisor to deploy workers to different parts of the shop floor on unrelated product lines, in order to accommodate order fluctuations. Additionally, it can highlight expertise, certifications,

As manufacturing processes tap advanced analytics to leverage big data insights, becoming an early adopter is critical for success

and training requirements, while coordinating with plant operational needs at the workstation level, providing the right capabilities at the right time for production. To maximize equipment utilization and throughput, identifying people requirements with skills available will improve efficiency and confidence that equipment has and help properly calibrate to produce high quality parts accorind to the specifications.

► Material traceability. In 2000, Ford Motor Company and Firestone Tire became embroiled in a controversy involving the Ford Explorer and its Firestone tires. Thousands of people claimed to have been injured due to tire tread separations that led to Explorers rolling over. At the time, the lack of big data at the base manufacturing

level undermined an effective root cause analysis of the tire defect. Today's technology provides the capability for manufacturers to track each component used in a particular product back through the supply chain to its origin. Such information can be critical in the case of a defective auto part or medical device,which can have dire financial and public relations implications (especially when a recall is necessary). In the case of Ford and Firestone, it would have allowed precise tracing and identification of the defective tires back to their date of manufacturing, their production specifications, the manufacturing processes used, and even the packaging in which it was shipped. Both companies could have potentially avoided or at least mitigated the negative impact to their brands and financial results.

► Global supply. As recently as a decade ago, most manufacturers worked with a handful of suppliers, the majority of whom were located in close proximity to their plants. But today's manufacturers rely on a global supply chain to remain competitive, a highly complex process that depends on big data and predictive analytics to function properly. For instance, advanced analytic software can continually assess supply chain risk factors, allowing executives to anticipate and better respond to potential disruptions. On a more basic level, a supplier portal can accommodate multiple languages, currencies, and exchange rates, allowing a manufacturer to communicate seamlessly with its suppliers, wherever they're located.

Capturing and delivering information is only as useful as the ability to access that data. That's why today's software is configured to work with smartphones, tablets, and other portable mobile devices, providing instant linking to every phase of the production process across an entire organization. Of course, even the most relevant data is meaningless without the right tools —

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analytics embodied by data discovery, data visualization, and reporting — to transform data into actionable insight. Extracting data efficiently is critical for measuring performance and guiding the decision making process. And to be truly effective, that process must be systematic, sustained, and embraced across every level of the enterprise. The big data approach cannot be cyclical or periodic; a performance snapshot loses its meaning as soon as the moment has passed.

The marketplace is littered with companies that failed to adapt or did so too late. For those manufacturers looking to remain competitive today, adopting a big data approach is not merely an option but an operational mandate. Manufacturers who have the vision and information to drive innovation and leadership in their use of big data will emerge as the winners. **MT**

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