FEATURED ARTICLE

Why the Automotive Industry Needs Data Analytics to Survive Digital Transformation

Digital transformation has disrupted the automotive industry with new technologies and challenges, while recalls are growing in number and cost.

"THE VEHICLE ELECTRIFICATION MARKET IS PROJECTED TO GROW AT A CAGR OF 11.9% TO REACH USD $129.6 BILLION BY 2025."

marketsandmarkets.com, September 2020

From cloud computing and artificial intelligence to electrification and autonomous driving, the automotive industry is evolving at a fast pace as new innovations are introduced every year. The cloud market alone in the automotive industry is forecasted to reach $66.95 billion by 2022, vehicle electrification is expected to hit $126 billion by 2025, and the predicted compound annual growth rate (CAGR) of the global autonomous vehicle market is 18.06% between 2020 and 2025 after being valued at $24.1 billion in 2019.

In today's fast-paced age of innovation and data, automotive manufacturers understand the importance of using data to gain an advantage. They are beginning to adopt technologies that rely on the latest cutting-edge innovations such as AI, 5G networks, and cloud computing. Nevertheless, many companies are still in the early stages of planning and deploying smart manufacturing systems. This is a step in the right direction, but most teams are still focusing on process—not product performance—and analyzing data in silos instead of holistically.

"HYUNDAI'S RECALL OF 82,000 ELECTRIC CARS IS ONE OF THE MOST EXPENSIVE IN HISTORY.... ON A PER-VEHICLE BASIS, THE AVERAGE COST IS $11,000."

CNN Tech, February 25, 2021

Despite impressive technologies, vehicles are still failing, which leads to expensive recalls as a result of blind spots. Most recently, Hyundai recalled 82,000 electric vehicles following reports of battery malfunctions. Though the number of recalled units is considered small, the price per recalled vehicle is one of the most expensive in history at $11,000. Compared with GM's recall of 7 million vehicles due to deadly air bag defects at under $200 per vehicle, $11K is astronomically high.

Attractive Opportunities in the Vehicle Electrification Market

Asia and Oceania are estimated to be the largest market for vehicle electrification as China, Japan, India, and South Korea accounted for 50% of global vehicle production in 2019.[1]

$73.7 BILLION
USD BILLION 2020-E

$129.6 BILLION
USD BILLION 2020-E

11.9% CAGR

The vehicle electrification market is expected to be worth $129.6 billion by 2025, growing at a CAGR of 11.9% during the forecast period.

This market growth can be attributed to stringent government regulations for emissions and fuel economy standards as well as the increase in demand for reliable electrical systems.

Acquisitions, expansion, and investment will offer lucrative opportunities for market players in the next five years The market is also driven by increasing government incentives and promotional policies for electric vehicles. But a slowdown in global vehicle production may restrain the vehicle electrification market.[2]

Blind Spots in Automotive Manufacturing

Automotive manufacturing processes today are filled with blind spots that lead to costly recalls. Adopting the latest technological innovations has led to a decentralized production chain while introducing millions of new components that need to work perfectly together. OEMs have limited visibility into what's going on throughout the entire production chain, which includes their own factories, Tier 1s, and many additional suppliers of mechanical and electronic components and software. Data is unreliable and siloed in manufacturing machines and production lines as well as vehicles' systems and components. Communication between these silos is limited and difficult to analyze for actionable insights. Additionally, this data is often not available in real time, which is critical in time-sensitive situations that require fast decisions. Meanwhile, a defect in a component anywhere along the production line can't be identified and tracked, leading to significantly more issues by the time the vehicle hits the road.

Things are only going to get more complicated as the industry evolves. According to the *Automotive Software and Electronics 2030* report by McKinsey & Company, "The days of OEMs comprehensively defining specifications and suppliers delivering

on them may be nearing an end. Neither OEMs nor traditional suppliers are in a position to fully define the technology requirements of new systems. Co-development between OEMs and suppliers is expected to become not just prevalent but necessary."

OEMs, who are aware of the problem, invest massive budgets in simulations and testing processes at the design and manufacturing stages, but they often lack visibility into the quality of the components they are using. At SEMICON Europa 2015, Audi illustrated the scale of the problem by pointing out that with 4,000 cars coming off the line each day, each with 7,000 semiconductor devices, a rate of one defective component per million would still translate into one defective vehicle leaving the production line every hour.

Using Data to Identify and Prevent Blind Spots

Industry 4.0, also called the fourth industrial revolution, involves automation and data analytics, that is, smart technology, in traditional industrial and manufacturing practices. Production processes today create vast amounts of data, which need to be collected, connected, and analyzed to identify when a component is not working as it should. Typically, automotive companies use data analytics for the production process, with a focus on production and capacity-related metrics such as throughput. For example, many factories are looking to use data to implement predictive maintenance to maximize equipment uptime. The assumption is that if the machines are all working OK, the products will also be OK.

NI's experience working with automotive Tier 1 suppliers shows that subtle interactions between components caused by minor variations in the manufacturing process can cause significant issues later on. Many of these issues can be identified only by approaching the problem holistically, which means collecting and modeling the data across manufacturing silos while using end-to-end tracking to ensure that data is reliable and without gaps. Once the data can be efficiently collected, it needs to be analyzed and translated into machine and product insights, so the focus can expand from the machines to the products. That's also where AI and machine learning technologies come in. They enable real-time analysis of big data and automated decision-making processes. This opens the door to truly "smart" manufacturing for which data analytics can drive actions on the manufacturing floor in real time.

Eliminate Blind Spots with NI

If you're already thinking about data and analytics, that's the right first step. Now it's time to ensure you have real-time access to a holistic data set and are using it to make product, not just process, optimizations. This is the only way to prevent increasingly costly recalls in an ever-evolving automotive landscape.

NI provides OEMs with an end-to-end AI and big data analytics platform that is fully equipped with the tools they need to generate actionable product insights. Operating on premise or as a cloud solution, NI's platform integrates directly into OEM systems and machines throughout the supply chain. It acts as a unified data model by bridging the different data sources and collecting the data in one place for analysis. By deploying AI-powered big data analytics, OEMs can automate smart decision-making, shorten time to market, streamline manufacturing processes, and significantly reduce recalls.

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[1] THIS MARKET REPRESENTS THE VEHICLE ELECTRIFICATION MARKET EXCLUDING THE 48 V VEHICLE MARKET.

[2] MARKETSANDMARKETS.COM, VEHICLE ELECTRIFICATION MARKET.