Assembly line operations deploy high-level data to correct defects immediately.

BY MICHAEL MARTIN

Manufacturers are re-engineering processes to use technology at a more granular level. PHOTO: FOTOLIA

Making a DIGITAL transformation

HOW IIOT IS CHANGING THE AUTO AND AEROSPACE INDUSTRIES

You have likely heard of the Industrial Internet of Things (IIoT). It connects complex equipment and systems to cognitive and analytical intelligence so they run better, safer, cleaner and more efficiently.

In the automotive and aerospace sectors, operating models continue to move toward connected systems that drive cost reductions and improve other business considerations related to product quality and time-to-market.

Until recently, transportation manufacturers have operated in an assembly line model. In automotive plants, vehicles have been built using the same design and manufacturing plans for each one. Processes are mostly manual, including critical quality assurance stages that are executed as stand-alone tasks along assembly lines.

As more manufacturers adopt IIoT to improve manufacturing processes, they're testing and diagnosing production-related issues via real-time analysis. Instead of building then checking, they're testing in real time as vehicles flow along the assembly line to detect, identify and correct defects immediately.

One major car manufacturer performs all testing before the body has been attached to the vehicle's chassis, completing diagnostics along the assembly line. As vehicles become more complex, real-time diagnostics are driving more value to the bottom line.

Unlike 20 years ago when quality assurance would focus on the engine, the transmission and other major components, manufacturers must now check systems we would have never imagined years ago. Are the seats heating and cooling as they should? Do seatbelts meant to activate with the brakes actually work? With IIoT, computers are continually talking to each other to ensure all these parts work seamlessly and exactly as designed.

Taking this one step further, manufacturing in real-time through IIoT allows for optimization and customization. Vehicles used to come fairly standard. Now, production lines quickly scale up and down to meet customer demand for a product, while easily personalizing vehicles to customer specifications.

The IIoT approach is also leeching into aerospace. Real-time diagnostics minimize physical inspections and downtime. Now, preventive maintenance is performed with periodic checks, requiring the physical removal of pieces of the aircraft for inspection. But with continuous inspection by thousands of sensors, last minute issues are caught before they become critical concerns.

Identifying issues

IIoT systems identify issues before they're seen by the human eye. This minimizes downtime and improves passenger safety.

IIoT also allows aircraft manufacturers to rebuild components such as wings and make major changes to the aircraft aerodynamics. New sensors measure every twist, flex, lift, compression and stress on the plane's wings, communicating that information in real-time to cognitive analytic systems.

New airplanes are being built to track data from thousands of sensors. Pratt & Whitney's new geared Turbo Fan engine has 5,000 sensors that generate up to 10 gigabytes of data per second. To put that into perspective, a single twin-engine aircraft equipped with one Pratt & Whitney engine – average flight-time of 12 hours – would produce up to 844 terabytes of data.

What will they do with all that data? Married to cognitive computing, it produces artificial intelligence that predicts demands on the engine, maximizing thrust levels to cut fuel use by up to 15% while reducing engine noise and emissions.

Manufacturers that maximize the benefits of IIoT to boost analytics functions perform better quality control, speed up processes, and track plant assets with the benefits accruing to the bottom line. Multiple tasks (such as assembly and quality assurance) are done in parallel to make better use of resources, which is reducing costs and increasing the speed new products come to market.

There's a seismic shift in manufacturing as integration of connected technology meshes with virtually every industry ecosystem. The global IIoT market reached nearly $130 billion in 2016 and is expected to grow at a compound annual growth of more than 25% by 2025, even as it evolves.

Manufacturers at the beginning of their IIoT journey should not consider it an all or nothing model. It takes time to transition from older to newer systems. A staged and thoughtful approach will drive tangible value.

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Comments?
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