Prescriptive maintenance – the future of asset management

The high cost of failures and repairs – and the impact of asset downtime – are issues that keep everyone awake at night. Things break. Parts wear out. Components fail. And when they do, it's a scramble to fix them – and in the meantime, progress and productivity grind to a halt. To keep things running on ground, maintenance comes into play. And the approach to maintenance itself has been evolving over a period of time, drifting away from reactive methodologies.

The evolution of maintenance

Descriptive Maintenance – It comes into play once a machine goes into breakdown. Descriptive only details the history of problems and elaborates on the reasons behind the occurrence of issues. In the event of a similar breakdown occurring in future, the maintenance engineer could always go back and look into the diagnostics to reduce mean time to repair.

Preventive Maintenance – It's been an age-old practice to schedule maintenance where OEM would suggest maintenance windows. The machines and equipment would be taken offline, whether it's truly necessary or not. For e.g. A car comes with OEM specified servicing schedules depending upon the number of miles driven or post certain number of days, whichever is earlier. Performing maintenance when it's not needed is wasteful. And things are prone to breaking anyway. Also, with products becoming smarter by the day, this seems like an archaic method of maintenance.

Predictive Maintenance - In the digital world of things, maintenance has moved from the equipment level to component level. With the number of sensors rising per piece of equipment, one can pin-point the exact rouge component. The solution to optimizing system performance is in performing maintenance just in time: predict failures by measuring and characterizing the environment and condition of parts, assemblies and systems in real-time. This is the holy grail of asset maintenance – fix it just before it's going to fail.

The next phase – Prescriptive Maintenance

Several trends are merging to disrupt manufacturing—especially on the maintenance front. These include the main forces of digitization (Social, Mobile, and Cloud), Internet of Things, and Big Data analytics. A new PAC/CXP Group study, sponsored by Wipro, finds that European manufacturers and transport operators are turning to Internet of Things (IoT) and predictive analytics to improve operations and business outcomes. When data and analytics are combined with connected assets, systems and platforms, the outcome is a predictive maintenance capability which can significantly impact resource availability and productivity.

Prescriptive maintenance goes beyond the realm of preventive, descriptive and predictive maintenance. It not only leverages the approach and capabilities of statistical models & forecast techniques but also provides users with the options regarding corrective measures that can be acted upon. With prescriptive maintenance, devices in collaboration with operators are proactive participants in their own maintenance.

Prescriptive Maintenance and the connected car ecosystem

Consider a scenario where Sam - an owner of a large-size family SUV vehicle - is going with his family for a weekend vacation and a few hours into his long journey, Sam observes the vehicle braking becoming a bit harder and notices that the "Check Engine" light comes on. Sam becomes worried as to what the issue with his vehicle is and wonders whether it might spoil his vacation plan with his family.

It would have been great if Sam got real-time assistance to address his vehicle's issue and immediate diagnosis of the issue by an expert service technician. This would have helped him get back on the vacation journey with minimal disruption while also leaving him delighted with his service experience.

A real-time vehicle health monitoring capability through a connected vehicle platform combined with an early warning prescriptive service maintenance approach to detect, diagnose and rectify such issues could have helped in situations like these and deliver delightful customer experiences.

What the future holds

Real-time prescriptive maintenance has been a pipe-dream that brings together sensor data, event-streaming, in-memory databases and real-time analytics, and combines them with decisioning and workflow orchestration. Now, in one unified environment, IoT-led real-time asset monitoring and remote management solutions capture and triage sensor data from an array of vehicle components and combine it with other events or reference information. The maintenance person can be proactively dispatched to assist the customer and make the fix — maybe even before the end-customer is aware of the problem.

Leveraging IoT Sensor Data, Decision Models, Analytics and Decision rules can help prescribe the required maintenance well ahead of time. This can be extended beyond automotive to other smart devices, machines & manufacturing assemblies too. In this ever-evolving smart world, prescriptive maintenance can become the new norm.

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Prashant has more than 8 years of diverse experience in automotive manufacturing, product development and business development. He is part of the Automotive domain team that provides consulting services to automotive clients for digital transformation. His areas of interest are connected vehicle services, customer experience & digital-led business transformations.

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