



UNIVERSITY OF MISSOURI – ST. LOUIS

2018 INTERNATIONAL BUSINESS CASE COMPETITION
Nidec Motor Corporation: Global IIoT Strategy

The Industrial Internet of Things (IIoT) promises to create significant advantages for global firms who adopt both the technologies and strategies needed to exploit the perceived benefits surrounding this innovation. However; firms looking to adopt IIoT face many questions. Nidec Motor Corporation is exploring this exciting market with a cloud-based wireless equipment monitoring platform that has the potential to change both the motor manufacturing and maintenance industries. Nidec Motor Corporation faces two main challenges: (1) IIoT product strategy and positioning, and the impact on the service, repair and manufacturing industry with its route-based monitoring and (2) global guidelines on data protection, ownership of sensor data and the insights that come from that data.

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I. Case Overview

As Thomas Schardt, Senior Director of IoT and Pranesh Rao, Senior Product Manager IoT discussed the evolving IoT products and strategies for IoT at Nidec Motor Corporation, Schardt joked, “If I.O.T at Nidec is not UP, we are O.U.T!” While both Schardt and Rao have extensive experience in the design, manufacturing and marketing of motors and control systems, and Internet of Things (IoT) arenas in other industries, this new initiative at Nidec is an exciting, new challenge for them. They are tasked with creating, developing and executing a critical strategy that helps them cope with the digital transformation. Namely, as the world’s largest manufacturer of motors and controls, *how can Nidec Motor Corporation capitalize on its strength, experience and expertise to leverage IoT in a way that creates a strategic advantage?* Their strategy must address security, privacy, ownership of data, the impact on route-based monitoring, their relationships with their customers and the competitive landscape.

II. Brief history of Nidec and IIoT

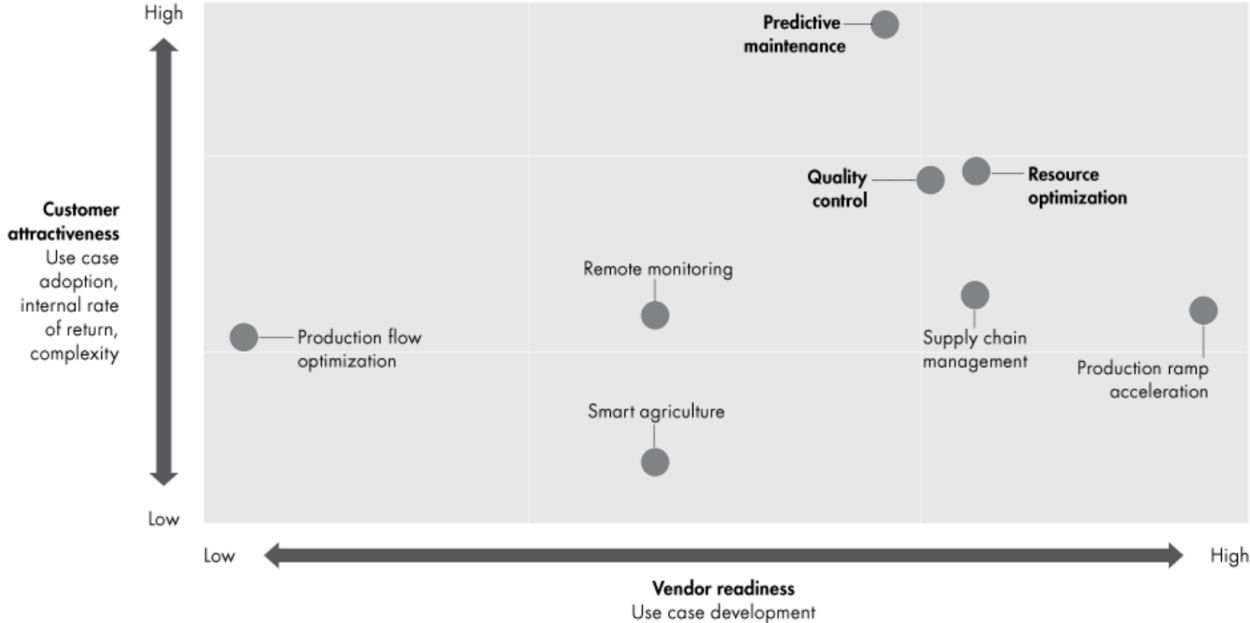
Nidec was started in 1973 by the current CEO, Shigenobu Nagamori in Nishikyo-ku, Kyoto, Japan. Beginning with very little capital and no plants of their own, Nidec has quickly grown (through both organic growth and acquisitions) to be a global leader in “everything that spins and moves”. Automotive, appliance, commercial and industrial products (inclusive power generation) represent the largest percentage of their sales followed by small precision motors and machinery. Currently, Nidec has over 107,000 employees and global sales of \$10.59 billion. According to Forbes, they are 90th on the

list of the Top Regarded Companies, 355th on the list of the World's Best Employers and, in 2015 they were ranked as the 95th most Innovative Company. In October of 2010, Nidec Motor Corporation was established through the acquisition of the motors and controls business of Emerson Electric. It is the Nidec Motor Corporation that is tasked with the creation of the global IIoT strategy and solution portfolio for Nidec's ACIM Business segment.

The terms Internet of Things (IoT) and Industrial Internet of Things (IIoT) are concepts centered on the interconnectivity of devicesⁱ. Adopting IoT in manufacturing applications to improve productivity is a global trend. "Industry 4.0" and similar Initiatives aim at increasing operational efficiency and infrastructure performance. IoT enabled devices can autonomously collect data, communicate with networks, monitor and interact with the environment. The technologies behind IoT and IIoT include "smart" devices, Internet Protocol addressing, wired and wireless connectivity, sensors, data transmission, cloud and local storage. It is estimated that by 2020, 30 billion objects will be part of the IoT Industryⁱⁱ with the transportation, infrastructure and healthcare segments leading the way.

On the IIoT front, the use of IoT devices for "Predictive Maintenance" (described later in the case) arena is particularly attractive to customers. As the figure belowⁱⁱⁱ shows, the potential rate of return, adoption and complexity all rate very high in the customers'

view of the attractiveness of IoT. The ability to remotely, proactively and non-intrusively ascertain the condition of industrial equipment is potentially an overwhelmingly positive application of IIoT.

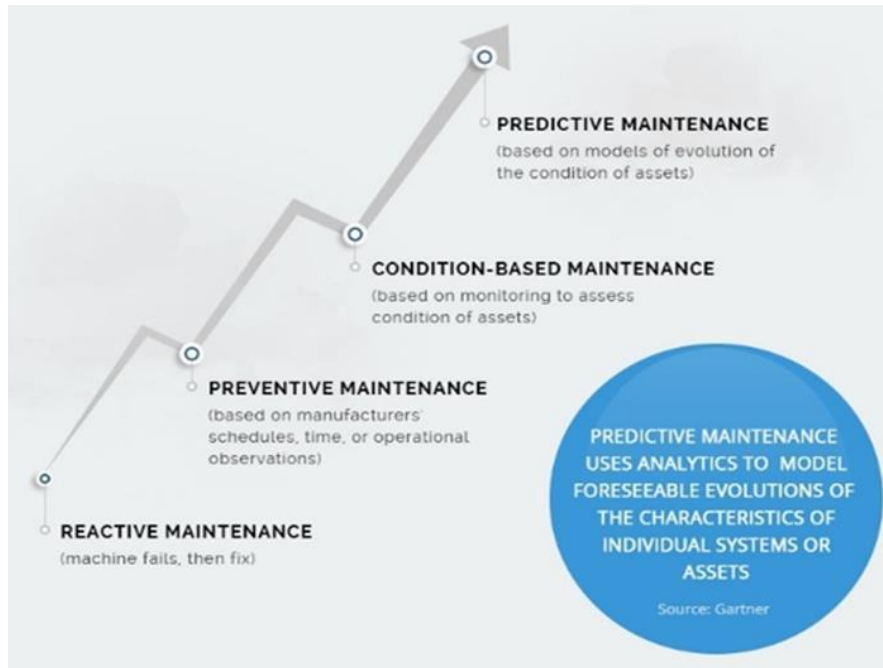


Sources: Bain IoT customer survey, 2016 (n=533); Bain IoT vendor survey, 2016 (n=158)

III. IIoT at Nidec Motor Corporation

As the world’s leading manufacturer of motors and controls, the ability to monitor the status of motors is of critical importance to Nidec Motor Corporation, their partners and their customers. All motors have a lifespan and require regular maintenance and repair to ensure functionality. The internal components of all motors eventually wear out and need to be replaced. A critical indicator of motor health is vibration in combination with temperature. Simply put, increased vibration or temperature is often an indicator of a deteriorating condition leading to impending failure. To manage this impending

failure, production and maintenance managers could proactively inspect motors for abnormal vibration and take preventive action or utilize “reactive maintenance” and wait for a failure to replace or repair the motor. Both modes of maintenance have their positive and negative attributes. Preventive maintenance allows for the ability to reduce the risk of a failure and to some extent control the timing of repair or replacement. However; sending service people on a “monthly route-based” plan to inspect motors is time-intensive, expensive and maintenance personnel are tied up with inspecting motors that, for the most part, are functioning well. Reactive maintenance does not require personnel to actively inspect functioning motors and is (in the short run) far less expensive. However; an unplanned failure of a critical motor/[asset](#) can present significant risks for safety, loss of productivity, interruption of service and emergency repairs which can be significantly more expensive. According to Gartner Research, maintenance of equipment is evolving to a more condition-based and predictive model.

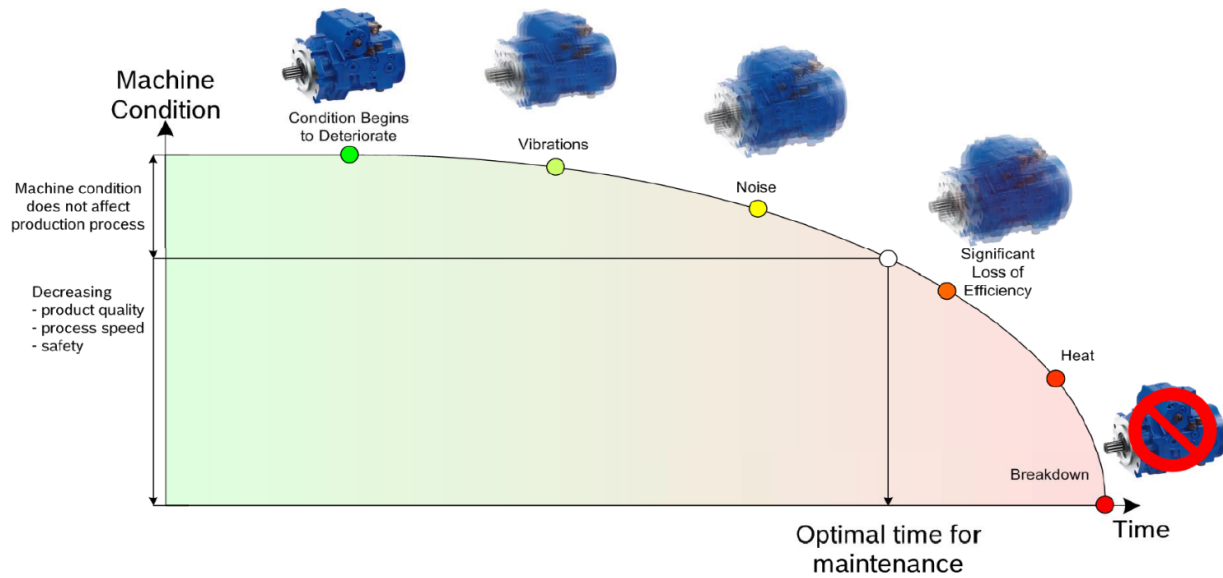


Nidec Motor Corporation began in 2015 to explore IoT product solutions and in October 2016 NMC addressed this trend and hired Thomas Schardt as Senior Director of IoT. In February 2017, they added Pranesh Rao to the IoT team as Senior Product Manager.

IV. The FORECYTE wireless equipment monitoring platform solution and Predictive Maintenance

Historically, the ability to accurately predict the optimal time to service a motor has been part art and part science. Engineers, vibration experts, maintenance managers, technicians, etc. would use their experience, expertise and instinct to determine the best way to "prevent" a failure while balancing cost, uptime, safety and productivity. IIoT presents a way to add more science to the process and make the collection and interpretation process much more effective. As the chart below from Thomas Schardt shows, motor conditions, vibrations, noise and heat can lead to significant loss of

efficiency and ultimately failure.



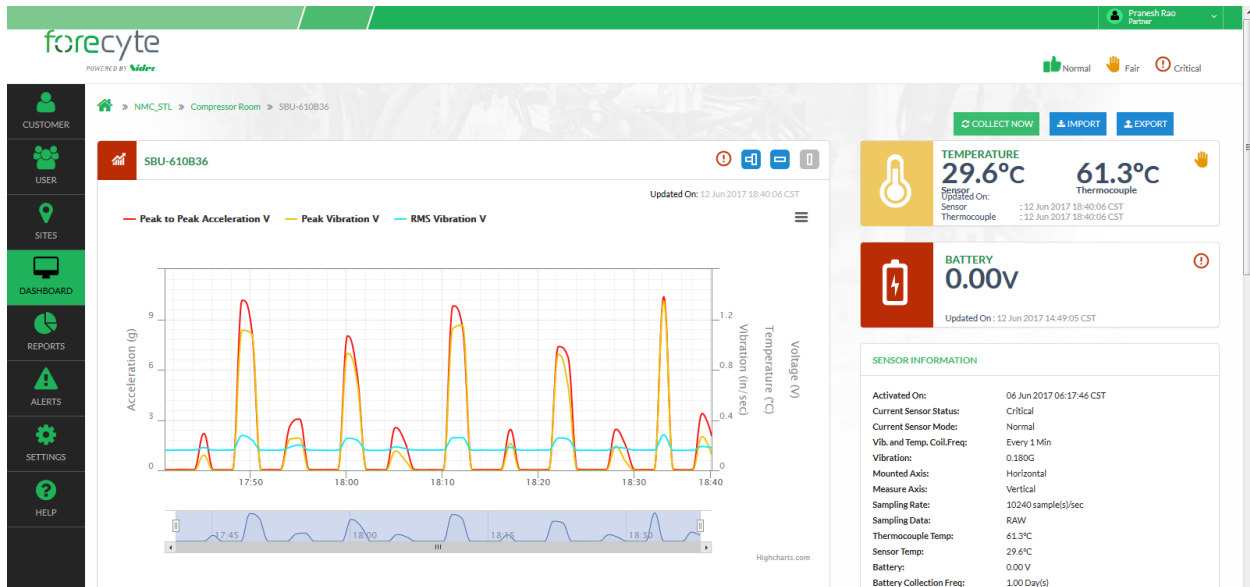
Nidec Motor Corporation (NMC) needed a way to “babysit” a motor and understand its performance in the field without having maintenance personnel and engineers burdened with that costly and time-consuming responsibility. The FORECYTE™ equipment monitoring platform (described below) is designed to be a solution to the “science” portion of preventive maintenance. IIoT and the FORECYTE platform represent a decoupling of three previously integrated phases of maintenance: detecting, diagnosing and servicing. Prior to IIoT, the business models of both original equipment manufacturers (OEMs) and maintenance, repair and overhaul providers (MROs) utilized the detection of impending equipment failures as a source of revenue. They would enter into service contracts with the end user to detect, diagnose and service equipment. With the creation of the FORECYTE platform solution, those companies that have a traditional route-based maintenance service face disruption of their revenue stream. This disruption is of concern to Nidec Motor Corporation as the OEMs and

MROs are Nidec Motor Corporation's customers. NMC recognizes what impact IIoT will have on service providers, "When we talk about IIoT, providers worry about becoming disconnected from their customer. Visiting sites, walking around and talking with their customers on their routine maintenance visits creates a sense of service, connection and engagement with their customers. When something goes wrong, the customer immediately thinks of the service provider as a solution provider. End users expect access to real-time data at a much lower cost. IIoT based solutions empower end users with more insights to their equipment's health condition and can disrupt the relationship with their service provider in many facets. NMC is exploring new solutions and business models to cope with the challenges these new disruptive technologies provide while fostering the business relationships with the OEMs and MROs (avoiding/limiting a direct competition with our own sales channels)."

The FORECYTE platform is NMC's first wireless condition monitoring solution. The FORECYTE sensor is a significant accomplishment in remote monitoring. It is designed to attach to a motor via a 25 lb. pull-force magnet (or stud mount), and operate in an industrial environment for 3 years on a battery (depending on data collection intervals). Most importantly, it can detect heat and vibration anomalies of motors and the driven equipment and then transmit that data wirelessly via a gateway to the cloud where data is aggregated, stored, accessed, analyzed and visualized.



In addition to the creation of the sensor itself, the IoT team at NMC developed the ability for its customers and service providers to remotely access and analyze the vibration and heat data via a preventive maintenance analytical dashboard, seen below.



According to Schardt, the FORECYTE system solution provides engineers and vibration experts significant insight into the life and status of a critical asset (smart motors+) and allows them to use their experience to take action. “It’s not only how they collect the data most ideally, most effectively, but also what does the data mean? OK, your equipment is vibrating, nothing new, but why is it vibrating, what is the root cause, and what does it mean to my process? Because in the vibration frequency spectrum you can identify what the root cause is. Is it misalignment between your motor and the driven equipment? Is your structure not properly set up? These are all factors you need to understand and know before you’ll be able to avoid or reduce the risk of an unexpected equipment failure. Nidec's FORECYTE will not only provide important insights to critical equipment’s condition but also the foresight to what scope of maintenance will be needed by when to ensure highest uptime at lowest cost.”

V. IIoT Challenges

Challenge One: The positioning of FORECYTE

While the creation of the FORECYTE sensor and monitoring platform solution is a significant step in the creation of an IIoT strategy for Nidec Motor Corporation, it is only the first step, and subsequently creates important questions as it is developed and rolled out. Specifically, how should FORECYTE be positioned in the market? In general, the motors Nidec Motor Corporation manufactures become components in the end product of other companies. For example, a Nidec motor is embedded by another company into a piece of industrial equipment (such as a pump, compressor, etc.) and

then sold to the ultimate end customer. FORECYTE has the potential ability to significantly change the servicing arrangement between the ultimate end customer and Nidec's customer, the manufacturer of the industrial equipment (OEM) or a service provider for the MRO industry (maintenance, repair, and overhaul). For example, the OEM manufacturer is likely also a service provider offering some form of monitoring for their equipment. FORECYTE may create a situation where Nidec is competing with its own customers in the service and maintenance market. This represents a serious challenge in the IIoT strategy for Nidec Motor Corporation. In reflecting on this challenge, Schardt commented, "The [service] industry is not really welcoming IIoT solutions, because they see it as a threat. Their main purpose is to service, maintain and repair electro-mechanical equipment. IIoT solutions will disrupt and challenge this market. How shall NMC position this new platform to take advantage of its capabilities while not alienating the service industry, whose members are often our direct customers?"

Challenge Two: Data Privacy, ownership and analytics

As a global corporation, Nidec Motor Corporation must understand global regulations and guidelines as they pertain to generation, transmission and storage of data. The data generated by IIoT devices is significant. The laws governing the ownership, transmission and protection of data vary by country and region. For example, the United States, lacks a unified set of guidelines for the transmission and storage of data. However; the European Union is governed by the European General Data Protection

Regulation (GDPR). Additionally, the ownership, access and utilization of the sensor data remains unclear. According to Schardt, "Another question is who owns the data? That is a wide-open question that we don't have a firm answer to – you have 5 people with 6 opinions. Owning data is power, because you have all the insights. You can work with the data and draw your conclusions."

VI. Conclusion

Nidec Motor Corporation sees IIoT and the FORECYTE monitoring platform as enablers of both significant opportunities and disruption in the global manufacturing and servicing industries. Thomas Schardt and Pranesh Rao are tasked with the development and implementation of a global IIoT strategy that addresses the two main challenges detailed in this case: product positioning and global adherence to the guidelines that govern the ownership and data privacy of sensor data.

ⁱ Very special thanks to Kristina Linden, Michael Moorhem, Aaron Reynolds, Ben Taylor and Erin VanTrease. Their paper “The Internet of Things: Overview, Case Studies and Best Practices” provided significant background, content and research for this case.

ⁱⁱ Baurer, H., Patel, M., & Veira, J. (2014). *The internet of things: Sizing up the opportunity*. Retrieved from McKinsey & Company:
<https://www.mckinsey.com/industries/semiconductors/our-insights/the-internet-of-things-sizing-up-the-opportunity>

ⁱⁱⁱ <http://www.bain.com/publications/articles/choosing-the-right-platform-for-the-industrial-iot.aspx>