Asset Tracking and Preservation via Cloud-Based Tools, Inside the Siemens Life Cycle Management Model

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Oversight for maintenance of $250 million in industrial assets mothballed in six warehouses across the U.S. required a seamless, transparent, data-driven workflow, such as the cloud-based, mobile solution Siemens deployed, saving $5 million in customer costs. It provides real-time, geo-based status of more than 1,000 individual, highly sophisticated components, a life cycle management task that is impossible with manual methods.

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Introduction

Recent years have seen the world expand its industrial prowess in two related ways: *scale* and *complexity.* As scale increases, complexity usually follows. The 10-year, $5.5 billion Panama Canal Expansion Project, doubling the original canal's capacity, is one example. Another is Chevron's giant $7.5 billion Jack/St. Malo floating production platform in the Gulf of Mexico. Not only are these projects vast in their respective scope, they're also extremely complicated to operate.

A third, even bigger, example is the $54 billion Gorgon liquefied natural gas (LNG) plant in Western Australia, a joint venture of Chevron, Royal Dutch Shell and ExxonMobil subsidiaries. With a forecasted annual output of 15 million tonnes, the Gorgon LNG plant's management must coordinate the operation, maintenance and safety of three massive production trains drawing their feedstock from 18 subsea wells. That's in addition to the job of running adjacent shipping facilities for LNG carrier vessels more than 1,100 feet long.

Taming complexity. Of course, what makes these types of complex industrial operations possible is technology — starting with field-level sensors, actuators, valves and the like delivering data to and controlled by higher levels of redundant, failsafe controls and management systems, communicating over secure wireline and wireless networks. Manual data collection and operating methods are too slow, costly and error-prone, not to mention they don't scale well.

But technology does scale well. Whether built into increasingly "smart" mechanical infrastructures or overlaying them, technology ties components and processes together, optimizing their operations. In addition, it provides operators and management with condition-based monitoring, remote diagnostics and visibility for decision support. Fundamentally, underneath it all, technology plays a complementary role: *to simplify complexity, especially that which comes with scale*.

Life cycle management. To make this technology-enabled model work, however, these capabilities require 24/7 availability, so both the technology and mechanicals need coordinated management of their post-deployment phases, which can span decades.

That's why Siemens developed its Life Cycle Management (LCM) concept as the core organizing principle for supporting customer water treatment installations, especially for the oil and gas industry that faces extraordinary challenges in this area. Now our scope of LCM services includes asset tracking and preservation using a cloud-based, data-driven workflow approach, accessible via remote devices, including smartphones and tablets.

Tracking and preserving $250 million in sophisticated assets – a case study

Asset tracking and preservation are two important LCM tasks with their specific applications depending on customer situations. The first can involve tracking asset availability, such as CNC machines and tools or raw materials and finished goods inside factories and warehouses. With geo-location technology, it can also help keep tabs on mobile assets, whether on trucks, railcars, ships or planes, or while moving through distribution centers.

The second task, asset preservation, is an activity that is critical to keeping assets viable and in operational condition, even if in storage. Such has been the case of a large North American oil and gas customer that engaged Siemens for help in doing just that. As a result of the downturn in market prices as well as other factors, it had to put a major infrastructure project on hold. This forced it to store $250 million in sophisticated equipment in six different North American locations.

The equipment includes more than 150 large, medium-voltage 6,500-horsepower motors, plus pumps and a wide range of accessories, such as variable frequency drives, power converters, switchgear, breakers and e-shelters. More than 1,000 components are still under multi-year warranties of different ages and need regular maintenance until the customer decides to use or sell any of them.

Avoiding hand-offs. Tracking and preserving these assets was complicated by the fact that, in addition to Siemens, two other major suppliers to the customer were involved. This meant the actual maintenance activities, plus their associated information workflows and recordkeeping had to be routed through four separate enterprises, all large organizations.

A solution was needed not only to physically maintain every piece of equipment, stored across multiple locations, but also to keep the maintenance information manageable, easily accessible yet secure for all parties, and auditable at any time. The magnitude of initial and ongoing documentation, including maintenance schedules, work orders, repairs, inspections and so forth, on the maintenance of such large, sophisticated equipment stretches the imagination.

Seeking scale. Clearly, any manual approach to the demands of these tasks — or even manual hand-offs to an automated systems or systems — would not scale, and would only introduce time, cost and errors into the process. What's more, any manual steps in facilitating the information-handling process would undermine the potential real-time visibility that an end-to-end technology solution could provide.
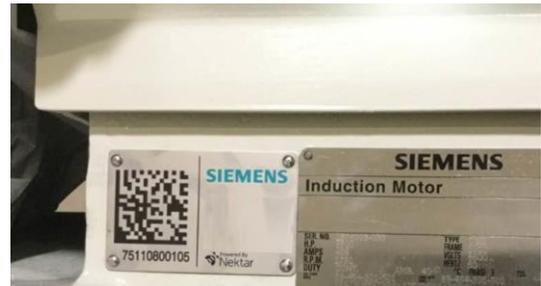
Working with the customer, Siemens developed a set of requirements to meet the information requirements of all participants. Needed was a proven asset tracking and maintenance solution that was flexible, quick and easy to deploy and use, able run on different mobile operating systems and devices, and could scale if necessary in the future.

Cloud-based, data-driven workflows, accessible via mobile devices

After evaluating numerous potential technology options, Siemens chose to base its asset tracking and preservation solution on a cloud-based, data-collection and asset-management platform from Nektar Data Systems (NDS). Before deployment, Siemens project team members worked with NDS business analysts to design and configure a system that would accommodate all of the requirements, including:

- Real-time reporting and visibility
- Specific geo-coding capabilities
- Automated workflows
- Remote, mobile access
- Web reporting console
- Fast, easy report-generation
- Encrypted security
- Tracking and tracing

Figure 1. QR codes are used with geo-location to track assets physical locations as well as maintenance and service histories.

The system design and configuration phase took just a few weeks. In parallel to that, technicians visited each asset, ascertaining its identity in the project database and labeling it with a rugged, steel tag embossed with Quick Response (QR) code as its unique identifier. Service technicians also downloaded the NDS client application to their preferred iOS or Android devices, whether smartphones or tablets. After minimal commissioning optimization, the system has worked flawlessly.

Automated workflows. Today, all workflows are electronic and automated. Now, each time technicians make a service call on a piece of equipment, they scan the QR code on the asset's tag and complete a check boxes on a form in the app on their phone or tablet. The app sends the data wirelessly to the NDS cloud, where it enters a master database, updating the asset's record with whatever preservation maintenance has been performed. The record shows the asset's location and all completed and pending tasks. Technicians can upload pictures, if necessary, to document equipment condition.

If the asset has been moved, the apps geo-location feature — accurate to within four feet — notes its new location. If the move was authorized, its addition to the asset's record, creating a chain of custody. If not, an alert can be issued, so an investigation can be immediately started.

Saving time and potential errors, the app facilitates the ordering of parts. For example, if a part needs replacing, the technician can take a few pictures of it, select the part number from a drop-down menu in the app, then click on save. This instantly sends a secure parts order with all key information, including the part pictures to all of the appropriate people.

These include those who must pull the part from inventory, package and ship it as well as those who just need to know, such as the shipping agents and finance. The automated workflow eliminates the potential for confusion and communication errors. The correct parts are ordered the first time, without the back and forth delays and costs of the wrong parts being pulled and shipped.

Improved coordination. When the part is shipped, a work order for its installation can be generated to dispatch a technician to coincide with the part's arrival. This kind of coordination cuts out the common and costly problem in manual dispatch systems of technicians showing up onsite, but lacking the parts to complete the service call. Also, an electronic invoice for the part is issued, too, which saves time and effort, while also improving the vendor's cash flow.

The NDS-based Siemens asset tracking and preservation provides a web-based console that displays comprehensive, real-time views of all current activities and work histories relating to the managed assets — whether in aggregate or by serial number, location, category, by warranty expiration, or any of several other parameters. Any factory recalls or service bulletins issued for a particular component can be immediately correlated with that component. If asset documents are needed, they can be easily retrieved from cloud storage, viewed and printed, if necessary.

Siemens project team members and those of its two partner participants as well as the customer can securely access this information from anywhere, at any time. What's more, managers can evaluate the efficacy of processes against established benchmarks and key performance indicators (KPIs), with the system flagging those needing attention and possible remediation with color-coding.

Savings of $5 million, plus greater visibility, insights and other benefits

The Siemens asset tracking and preservation solution has helped save the customer an estimated $5 million in project costs. One of the largest sources of savings was the consolidation and optimization of the asset storage, saving $42,000 a month. Another source has been approximately $400,000 in cost savings associated with radical reductions, if not total elimination, of workflow paperwork. Payroll savings have also added up, because no analyst time is required to produce project status reports: up-to-the-minute data is always available with just a few clicks of a mouse or touches to an authorized user's smartphone or tablet.

Other benefits include:

- **Greater visibility, reporting and insights.** With the Siemens solution, project management can instantly have current status and historical views of all 1,000-plus assets or segment the data in whatever way suits their needs at the time. Color-coded, graphic alerts can flag deviations from expected KPIs. This can help draw insights into areas needing attention and improvement to help optimize asset management and preservation.

- **Improved responsiveness and skills utilization.** The automated system improves the responsiveness of all project participants because it eliminates the cycle times and latencies associated with manual recordkeeping systems or patchwork automated workflows. In the past, maintenance personnel had excessive time tied up in paperwork and documentation which led to less time to perform those high priority tasks that required their training and experience.

- **Faster technology adoption.** Being able to download the Nektar app to their phone and start working right away not only saved time, but also enabled all participants to focus on the highest priority tasks first. This ultimately reduced time to breakeven and faster return on investment (ROI).

- **Accelerated workflows.** Documents no longer need to be sent from one sign-off authority to another. With a mouse click and an electronic signature, they are processed instantly unlike the previous paper-based print-scan-and-transfer methods.

- **Asset value retention.** With complete traceability from the latest inspection task all the way back to the asset's manufactured date, any potential buyer can see, with detailed precision and timeliness, all warranty work through the asset's entire life cycle. This helps increase and retain the asset's value.

Expanding life cycle management with asset tracking and preservation

The customer is reportedly quite satisfied with the Siemens asset tracking and preservation solution for safeguarding its large stores of capital assets. Based on the success of this deployment, Siemens is investigating how to apply the asset tracking solution in other projects, especially when asset preservation is required, and also how to apply it earlier in an asset's life cycle.

For example, the application could enable customers to document every custody transfer point for an asset. Pictures can be taken and the asset geo-tagged with GPS coordinates to provide another layer of transparency in asset handling and transfer. The system can also interface with enterprise resource planning (ERP) systems and other client-specific tools to facilitate even more applications of paperless asset management. This can allow highly skilled personnel, such as technicians and business analysts, to focus on more value-adding tasks, instead of chasing and handling paper.

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