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Emerson's Plantweb™ Advisor Suite helps drive Operational Certainty

New Health Advisor and Performance Advisor round out portfolio to help customers increase reliability, efficiency, safety and reduce energy consumption and emissions

Effectively leveraging the Industrial Internet of Things (IoT) to improve operational performance begins with generating continuous, in-depth, quality data on a plant's assets. However transforming that vast amount of data into truly actionable information requires robust and scalable software applications with powerful analytics that provide plant personnel with the specific information they need to ensure reliability and efficiency.

Emerson's Plantweb Advisor Suite is a scalable set of software products developed for that goal and is a key component of Emerson's Plantweb digital ecosystem. The comprehensive suite offers two new applications, Health Advisor and Performance Advisor, in addition to the previously released Energy Advisor – all of which leverage the industry-standard OSIsoft Pi System's highly scalable open data infrastructure that captures and shapes data generated by equipment.

"Together, Emerson and OSIsoft are creating a foundation for digital transformation," said Martin Otterson, senior vice president of sales, marketing and partners at OSIsoft. "Through the

combination of Plantweb Advisor Suite and the PI System, organizations will be able to rapidly achieve deep insights into their operations that in turn will help them boost productivity or develop new services."These complementary applications are designed to boost operational performance by empowering a plant's reliability, process and energy experts with critical information about equipment health and efficiency as well as energy consumption and emissions.

That information can be vital to improving or restoring a plant's profitability to industry-leading levels. Top Quartile performers can recover two weeks of available production per year as compared to their average industry peers. What's more, estimates show that 47 percent of unplanned outages are due to equipment failure, and the cost of repairing a failed asset is 50 percent higher than addressing the problem prior to failure. Further compounding the issue, the petrochemical industries are experiencing up to a 40 percent loss in primary energy due to various inefficiencies.

Plantweb Advisor Suite is designed to help plants achieve significant improvement across these areas. For example, a 250,000 barrel-per-day refinery using the suite can recover as much as $15 million a year in maintenance savings and new revenue, specifically resulting from 1.2 percent capacity recovery, 14 percent maintenance reduction, and 10 percent energy recovery.

Using the Plantweb Advisor Suite, a plant's essential assets are continuously monitored for potential problems with Health Advisor, operating efficiency of a plant's equipment is tracked through Performance Advisor, and Energy Advisor maps and manages a plant's energy consumption in real time.

Health Advisor

Health Advisor improves asset reliability, increases process availability and helps reduce safety and environmental risks by providing continuous diagnostics and equipment alerts prior to the occurrence of unplanned shutdowns or slowdowns. This information enables plant personnel to take corrective action and avoid production losses, expensive reactive maintenance and potential environment or safety incidents.

Many refineries are already using Health Advisor, including a 320,000 barrel-per-day refinery, which is monitoring more than 150 essential pumps for vibration, suction, strainer pressure, seal pressure and bearing temperatures to alert its maintenance engineer to perform further troubleshooting when necessary.

The preconfigured application combines process and equipment data to provide a single asset health number for a plant's essential assets, including air-cooled heater exchangers, blowers, compressors, cooling towers, heat exchangers and pumps.

- Air-cooled heat exchangers – Monitors for excessive cooling, fouling, bearing and gear wear, louver/pitch defects and operating near known resonance.
- Blowers – Monitors for bearing and gear wear, operating near known resonance, louver mechanical defect and plugged suction filter.
- Compressors – Monitors bearing and gear wear, compressor instability, control vane defect, low flow and plugged suction filter.
- Cooling Towers – Monitors for improper blowdown and makeup, fan/pumps issues and high/low cycles of concentration.
- Heat Exchangers – Monitors for cleaning required, lost energy cost, fouling factor and rates and duty error.
- Pumps – Monitors for pump vibration and cavitation, bearing temperature, strainer plugging and seal fluid/hydrocarbon leaks.

Asset health is derived from a patented algorithm developed by Emerson and defined as a range of zero (worst) to 100 percent (perfectly healthy). This is calculated as a function of machinery issues such as vibration or mechanical defects, and process issues such as pump cavitation or heat exchanger fouling. Overall asset health is weighted based on the criticality of the fault detected, and the solution monitors differences from a known good state. Given that process severity can, at times, outweigh mechanical severity, this approach ensures the most severe faults drive the determination of asset health.

Performance Advisor

Performance Advisor is a real-time application that calculates equipment performance, enabling plant operators to run processes more efficiently, track operating performance against targets, schedule maintenance activities and determine the root cause of production asset inefficiencies.

These inefficiencies result from the gradual deterioration of equipment throughout time. When this happens, plants can experience increased energy usage and reduced throughput. To combat this and ensure profitability, accurate identification of the deviation from equipment design combined with early detection is vital.

Employing Performance Advisor, one liquefied natural gas facility experienced a 1.5 percent overall performance increase on its four trains after maintenance to clearly identified under-performing equipment.

Performance Advisor achieves this by calculating thermodynamic-based equipment performance using first-principles models. These models monitor for deviations from design parameters on critical machinery, including turbines, compressors, boilers and other production assets.

- Pumps and compressors – Monitors for efficiency and deviations from design specifications for reciprocating and centrifugal compressors and pumps.
- Gas and steam turbines – Monitors exhaust temperature profile, operations cost analysis, wash recommendations and generator reactive capability.
- Boilers and heat recovery steam generators – Provides condition monitoring, boiler efficiency, unit heat rates and Rankine cycle operations cost analysis.
- Heaters, heat exchangers, and cooling towers – Provides condition monitoring for feed water heaters, deaerators condensers, chillers and cooling towers.

Energy Advisor

Energy Advisor is a real-time Energy Management Information System (EMIS) that automates the process of mapping and managing energy consumption as it is being consumed. Real-time alerts, dashboards and emails signal when energy consumption is higher than expected so that actions may be taken to reduce energy costs.

The application is built to receive energy measurement data and present it in a way that enables decisions to be made quickly, without wasting time on data manipulation and complex calculations. The state of site energy consumption can be easily understood, and a simple roadmap can be accessed that highlights concerns.

Employing Energy Advisor, a large North American manufacturer was able to reduce water and energy consumption, achieving a $6 million first-year return and effectively moving from fourth to first-quartile for energy performance.

The application provides an easy-to-use reporting package through which standard reports are available on demand to multiple users via a web-based interface. Examples include:

- Cost Per Unit (CPU) of production – specific energy costs per production unit at selected hierarchy level.
- Energy Key Performance Indicator (KPI) status – real-time percentage consumption of energy use against target for each energy stream and hierarchy level.
- Energy KPI Trend – real-time percentage consumption of energy use against target for each energy stream aggregated to the selected hierarchy level.
- CuSum – cumulative sum of savings against target.
- Time Series – versatile trends for each energy stream at the selected hierarchy level.
- Energy Cost – real-time cost of each energy stream aggregated to the selected hierarchy level.
- Energy Trend – total use for a particular energy stream plotted with target for same energy.
- Electrical Trend – electrical use plotted against peak value for current demand period.
- Electrical Demand Cost – allocates electrical usage and demand costs based on configurable contract constraint criteria for the current demand period.

The Energy, Health and Performance Advisor suite of software products integrate seamlessly with current site control, SCADA and/or enterprise systems, allowing implementation of a solution in a straight-forward and cost-effective manner. Plantweb Advisor suite applications are an easy migration and extension of investment in the Plantweb Insight applications when users seek more advanced analytics in a more integrated environment.

About Plantweb

Emerson's Plantweb™ digital ecosystem is a next-generation Industrial IoT portfolio that extends the power of automation beyond process control to the entire enterprise to enable Top Quartile performance. The ecosystem supports Emerson's Operational Certainty program, which is designed to help companies improve earnings as much as 15 percent. It meets four critical needs to do this: real-time operating data across the business, secure transport of that data where it is needed, robust and scalable software applications to convert that data into actionable insights, and the domain expertise to make decisions and drive outcomes. Flexible, integrated and scalable, the Plantweb digital ecosystem features robust, real-time visibility from Pervasive Sensing™ technologies, protected by Secure First Mile™ connectivity. Applications including Plantweb Insight, Plantweb Advisor and the AMS ARES™ Platform provide embedded domain expertise across the enterprise. Emerson Connected Services offer secure cloud-based

access to experts and analytics for real-time asset monitoring and performance optimization with no-to-low capital investment.