CUSTOMER PRESENTATION BRIEF
As presented at the 2013 EMEA User's Conference

OSIsoft.

SUMMARY

Fingrid Oyj

Industry

Power and Utilities

Business Value

- Maximize Asset Utilization
- Reduce Maintenance Costs
- Allow Timely Repairs
- Reduce Risk of Failure
- Optimize Capital Investment

PI System™ Components

- PI Server
  - Asset Framework
  - Event Frames
  - Notifications
- PI ProcessBook

Investment in a Real-time Condition Monitoring System Pays Off

With a network combining about 14,000 km of transmission lines and more than 100 substations, Fingrid Oyj, the electricity transmission operator in Finland, needed to find new ways to optimize network reliability while minimizing maintenance and investment costs. "Part of that task can be achieved by identifying the weakest-performing assets and hidden defects in components at an early stage," explained Fingrid planning engineer Kimmo Nepola while speaking at the 2013 OSIsoft Users Conference. "That allows us to not only avoid failures, but also to optimize the timing of new investments and maintenance."

Fingrid Oyj's plan was to build a condition monitoring system (CMS) that would achieve a few predefined goals. "Basically the business challenge could be described in three questions," said Nepola. "How could we monitor and analyze a large asset population with thousands of elements? How could we combine sources like SCADA, analyzers and enterprise asset monitoring/ERP systems together? And how could we build such a complex system that is still user friendly at the same time?"

To craft a solution, Fingrid personnel met with representatives from Amitec AS, a PI System integrator based in Norway, at the OSIsoft EMEA Regional Seminar in Barcelona in May 2011. "Based on the challenges and vision presented by Fingrid, we decided that Asset Framework (AF) should be the main data source for the system," said Asle Frantzen, Senior Software Engineer for Amitec who joined Nepola at the 2013 Users Conference. "We decided Notifications would be the natural way to deliver warnings and alarms to end users, and for the visualization part, we decided to create element-relative displays in PI ProcessBook" (Figure 1).

From that starting point, Amitec built a solution that features:

- Alarms with highly sophisticated trigger rules that automatically alert operators to performance issues in the firm's asset management system.
- Smart data visualization capabilities that combine real-time information with metadata.
- Simple-to-use analysis tools that generate results based on minimum values, maximum values, average values, ratios, trend curves, slopes, and health indices.

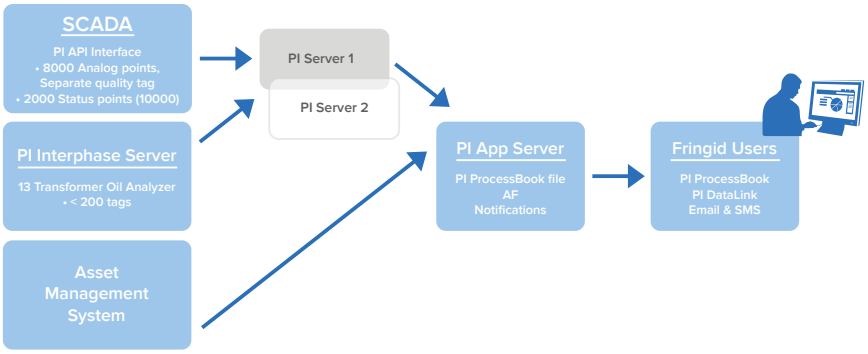

Figure 1. **Fringid's PI System implementation architecture.**

With a network of 70 transformers, 500 circuit breakers and gas insulated switchgear, 10 capacitor banks and SVC, and 12 reserve power plants, Fingrid and Amitec built a template-based hierarchy in AF that could serve as a single point of data for the CMS. The development team decided to create a main hierarchy of substations and then organize equipment in a repository by type. At the same time reserve power plants were grouped together, each with references to gas turbines and accessible in the equipment repository

Frantzer explained that AF uses about 10 element templates for structuring elements in the main hierarchy including rollups and aggregations. All elements also have estate attributes that function like a traffic light with 0, 1, and 2 corresponding to normal, warning, and alarm states. Frantzer noted that capability makes it very easy to drill down to the correct element and find out where a problem is located if the operator sees a status of 1 or 2.

The system uses approximately 13,000 element templates for equipment types with different variations. Each of these can have more than 100 attributes. Those attributes check for data quality and availability by using formulas and child attributes. At the same time, the system runs between 400 and 500 notifications belonging to one of eight different templates. The notifications are created automatically as new elements are added to AF.

The benefits of the CMS have proved well worth the investment. Online monitoring has significantly improved the operators' ability to detect gas leaks in circuit breakers and geographic information system stations, and operators have found the health index to be a highly useful tool to analyze large asset populations such as switchgear and optimize timing of maintenance and equipment replacement.

At the same time, maintenance personnel use the CMS to monitor assets daily and have already identified two transformer faults before they presented a serious problem. "Avoiding a catastrophic failure is quite a good achievement," noted Nepola. "But repairing those transformers will save us about five million Euros; that makes it even better."

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>
> - Kimmo Nepala, *Planning Engineer*

Nepola, Kimmo, Building a Condition Monitoring System Based on PI AF OSIsoft.com, September 2013. Web 5, May 2015. http://www.osisoft.com/resources/presentations/presentation_abstracts/2013_-_EMEA_Industry_Session_-_Transmission_and_Distribution/Building_a_Condition_Monitoring_System_Based_on_PI_AF.aspx?terms=EMEA%2bUC%2b2013%2bFingrid