

SkyFoundry Insider

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SkySpark® Analytics In Action

Driving Savings and Improved Performance by Knowing How Our Buildings Really Operate

One of the most effective ways for facility managers to reduce costs doesn't get delivered by a truck and doesn't require a huge capital outlay to start generating savings. Of course we are talking about using data analytics to identify issues in the operation of equipment systems.

Analytics finds issues that simply can't easily be found manually. From broken or inaccurate sensors, to overridden equipment and incorrect control sequences, analytics shows us how our building systems are really operating, where corrections are needed and where opportunities for savings exist.

But analytics does more than just identify issues, it can automatically calculate the financial impact of those issues to help us prioritize responses, financially justify expenditures, AND clearly see the costs of not addressing issues. The result is a move "data-driven facility management" and greater efficiency.

Analytics - The New Frontier in Improving Efficiency

Analytics - finding what matters in the data from our connected world - is fundamentally changing business and society.

Analytics are being used by police departments to improve crime prevention and response, they're being used in health care to improve diagnosis and treatment, and they're being used all over the web to improve sales, by more effectively identifying customer needs and buying behaviors.

It's only logical that we should be using analytics technology to improve the performance of our buildings and equipment systems. As the case studies in this issues show, it's easy to get started with analytics using the data we already have access to.

Hospital Diagnoses Energy Waste by Identifying a Problem in a Simple Airflow Sensor

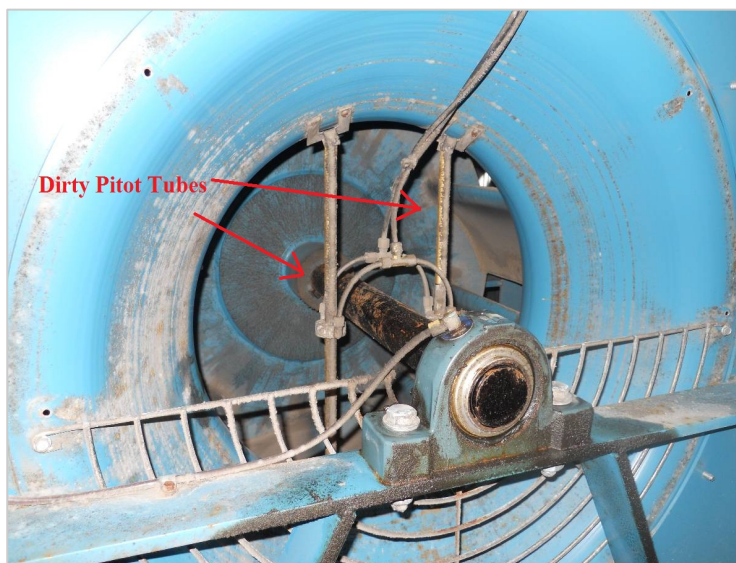
Large buildings usually have a preventative maintenance (PM) program of some kind for their HVAC systems. This usually includes scheduled filter changes, replacement of belts, and other parts of major equipment, but one item that is commonly left out is calibration of the controls and sensors on HVAC equipment. The old way of taking care of controls was “if it hasn’t failed then it still works”, but what many people don’t understand is that sensors and controls can still be functional but not accurate.

These inaccurate devices can result in excess energy consumption that goes unnoticed for months or even years. SkySpark can identify when calibrations are needed and calculate the energy impact if issues are not corrected. SkySpark can also make a HVAC controls PM more cost effective by autonomously identifying when maintenance work needs to be done and reporting the energy savings resulting from various fixes. We like to call it “data-driven PM”. A recent example from a large hospital shows just how analytics identifies these issues.

The Issue: Inaccurate Airflow Measurement. Airflow stations in AHUs are commonly used to monitor and maintain proper airflow in a building. These devices use pitot tubes and pressure transducers inside the unit to measure air pressures and calculate the flow. Pitot tubes must be kept clean to read accurately, and even with frequent filter changes they can become dirty. One AHU in the hospital had this issue causing the sensor to read a supply airflow value higher actual. To maintain proper pressure in the space the return fan VFD would then match the airflow of the supply. The result - significant wasted energy.

Once the issues was identified, simply cleaning the tubes allowed the airflow station to read accurate airflow and the fan speed controllers were able to reduce fan speed on both the supply and return fans.

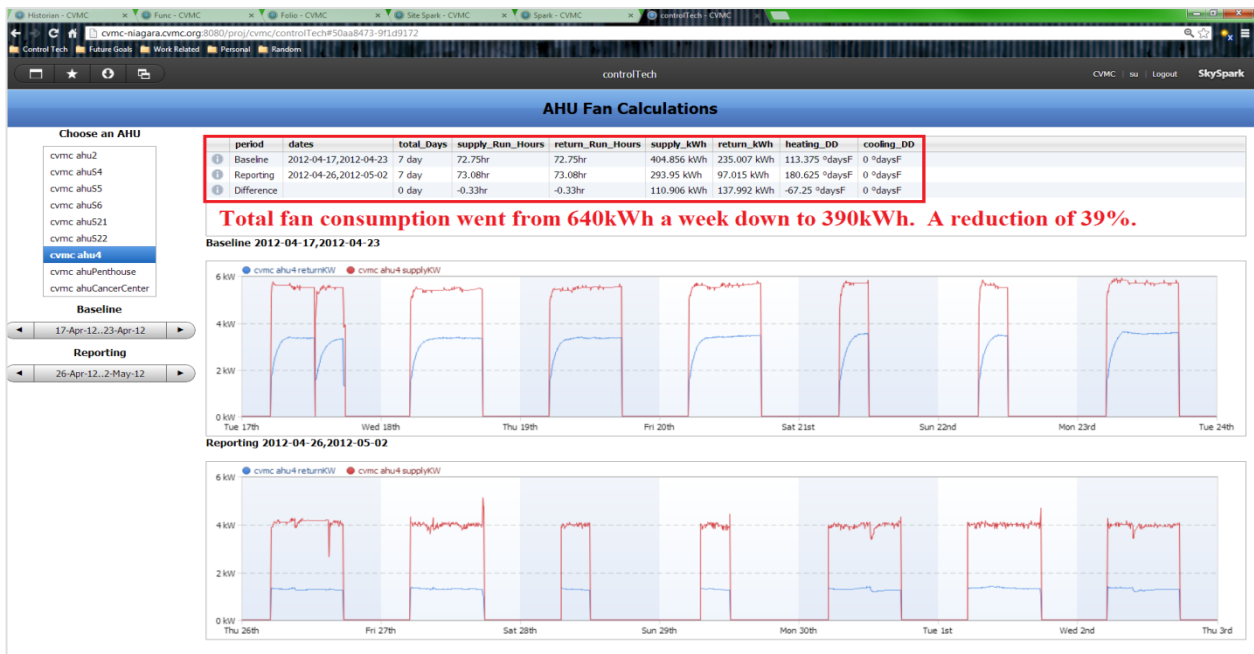
The results were dramatic as shown in the following SkySpark views. And after cleaning the pitot tubes, SkySpark was also used to calculate the energy saved.



Con't on Page 3

Dramatic Results from Detecting Sensor Calibration Errors *con't from Page 2*

In the first week alone there was a reduction of 250 kWh. Based on a 52 week year that is 13,000 kWh, and at \$0.10 a kWh that's \$1,300 in savings from about 15 minutes of effort. Hmmm - \$5200 an hour... Nice work if you can get it! *The value was in knowing the problem existed - this is the benefit provided by SkySpark analytics.*



Special thanks to Control Technologies Inc. for the information in this case study.

Learning What's Wrong Drives Energy Savings in a School



Buildings and equipment systems are complex. The building automation systems that orchestrate their operation contain hundreds (and even thousands) of sensors and other components. When they outright fail, building occupants notice because they get hot (or cold), or the lights go out. But what happens when control systems malfunction and produce erroneous data? Typically, the system responds to the bad data and controls equipment incorrectly, resulting in energy waste and other problems that can continue unobserved for years. This real world example demonstrates the value of SkySpark in detecting sensor failures that resulted in significant energy waste.

Location: Redmond Middle School, Lake Washington School District (LWSD), Washington.

The Issue: Air handling units simultaneously operating mechanical heating with the outside air damper open more than a predefined minimum, resulting in unnecessary energy use.

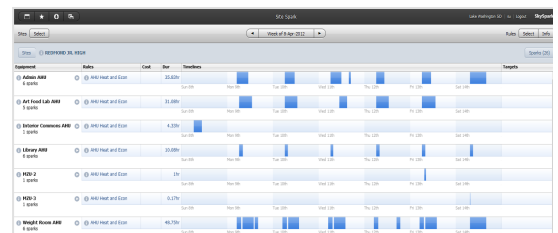
How it was Found: Shortly after SkySpark was implemented the AHU Heat & Econ rule started generating sparks at a significant rate on several single-zone Air Handling Units. The SkySpark rule generates sparks if the Heating Control Signal is opening the AHU's hot water valves for heating while an economizer command is simultaneously opening the outside air dampers to near maximum levels as if the unit was in a cooling mode.

The Investigation: All of the AHUs that had generated this spark had factory-installed outside airflow measuring sensors. The control system used the airflow signal to maintain minimum outside air (OSA) flow volumes. But there was a problem! The airflow measuring stations had failed and were sending erroneously low readings. This caused the control system to open the outside air dampers more than necessary and bring in excessive amounts of OSA. This energy wasting failure was not visible to operators and would not have been found without SkySpark or an extensive manual verification effort.

With the issue clearly identified, ATS worked with school district's Resource Conservation Manager (RCM), Jed Reynolds of Cascade Power Group, to determine the problem. Cascade Power Group provides RCM consulting services to LWSD to efficiently manage utility costs.

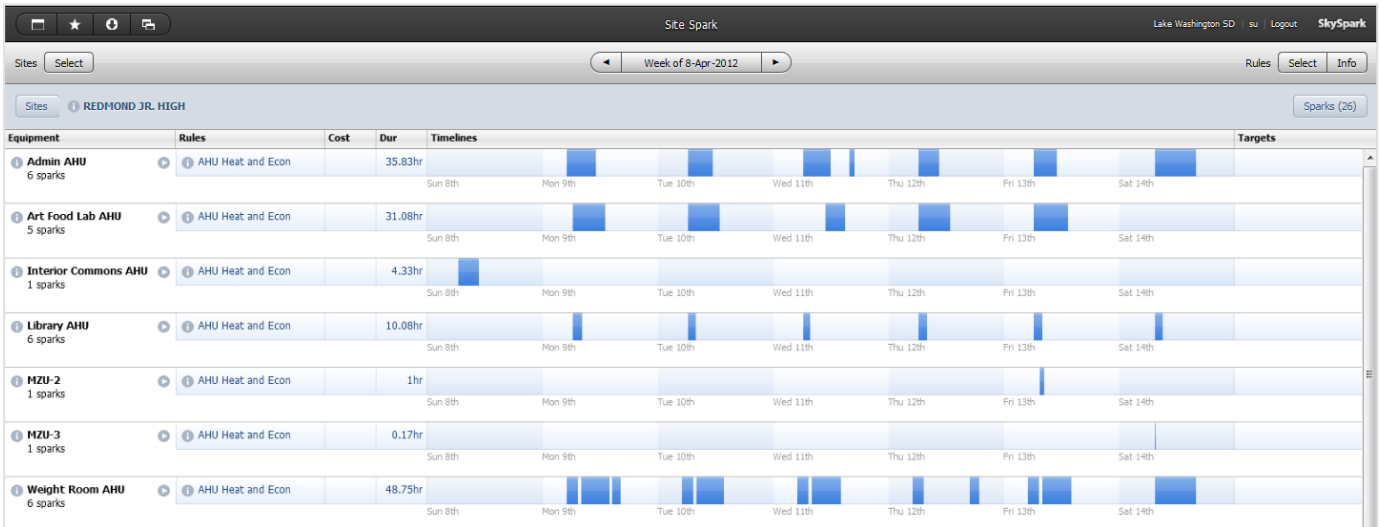
The Result: The SkySpark findings led the LWSD to implement a demand controlled ventilation retrofit in which the malfunctioning airflow sensors were replaced with CO2 sensors in the return duct. Outside air intake is now controlled only to maintain appropriate CO2 levels. **But wait - CO2 sensors could fail sometime in the future as well!** No problem, a SkySpark rule watches for failure of the newly installed CO2 sensors as well.

Let's look at the Spark details in the following views:

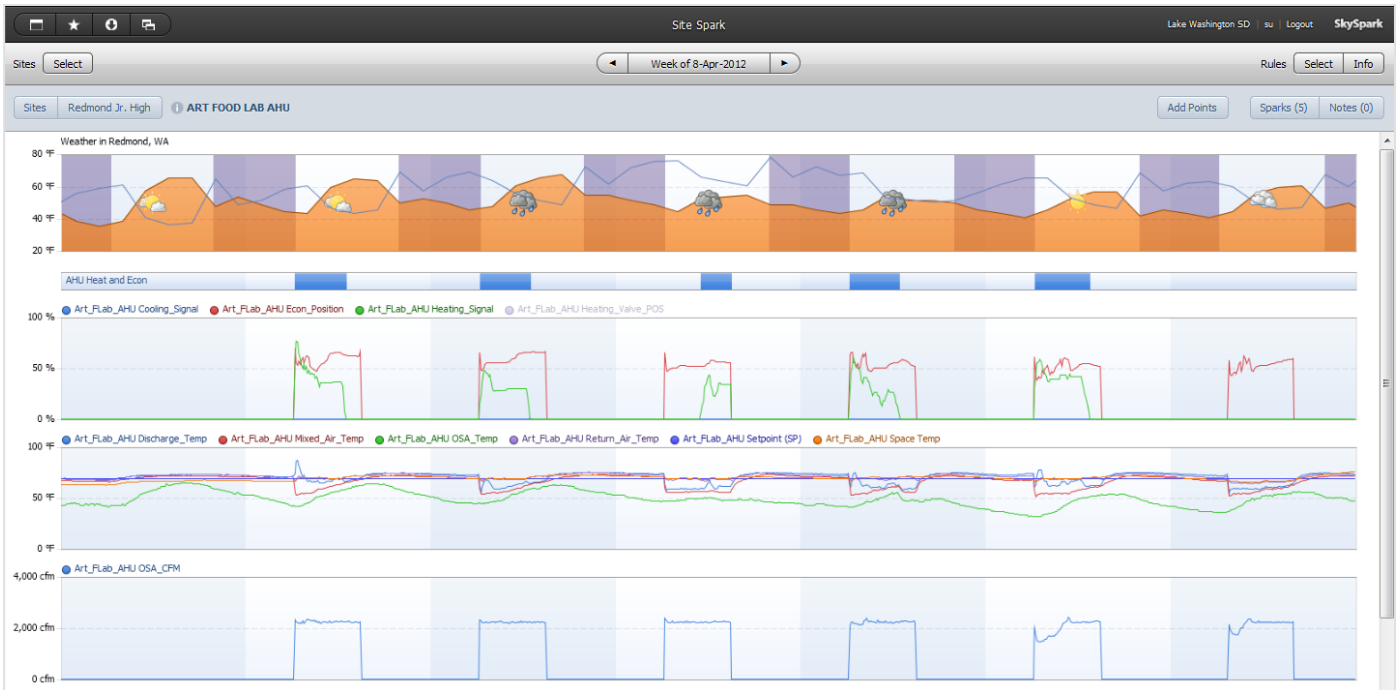


Identifying Energy Waste in a School *con't from Page 4*

In the view below we see Heat and Econ sparks occurring consistently on 7 AHU's during one week in April, 2012:



The following view shows full details on the Heat and Econ spark for a specific AHU during a one-week period.



Special thanks to Pete Segall, ATS Automation, and Jed Reynolds, Resource Conservation Manager, Cascade Power Group for the information presented in this case study.



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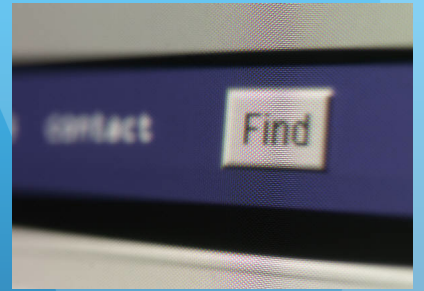


SkySpark - Analytics for a World of Smart Devices

The past decade has seen dramatic advances in automation systems and smart devices. From IP connected systems using a variety of standard protocols, to support for web services and xml data schemas, it is now possible to get the data produced by the wide range of systems and devices found in today's buildings and equipment systems.

Access to this data opens up new opportunities for the creation of value-added services to help businesses reduce energy consumption and cost and to identify opportunities to enhance operations through improved control, and replacement of capital equipment.

Access to the data is just the first step in that journey, however. The new challenge is how to manage and derive value from the exploding amount of data available from these smart and connected devices.



The new frontier is to efficiently manage and analyze data to *find what matters.*

SkySpark® 2.0 is Coming With Major New Features



Since its introduction SkySpark has been applied in over 2400 buildings consisting of over 125M sq. ft., resulting in millions of dollars of savings. SkySpark continues to advance with new features, analytic capabilities and reporting tools. **SkySpark 2.0** brings major new capabilities that take automated operational analytics to the next step.

New features include:

New data connectors - BACNet, MODBUS, Sedona - with real time watches, history synching and the ability to write back to control systems for advanced control applications.

Local Data Logging - SkySpark can now collect and log data internally to work with systems that don't have local logging capability in place.

New Navigation Tools - Enable more flexible navigation that is an ideal fit for very large-scale applications with 1000's of sites.

Connector Development Framework - SkySpark 2.0 now provides the ability for partners to create data connectors.

SkySpark 2.0 has been in test deployments with select partner for months with great results. It will be released to the market in January 2013.