Case Study:
Analytics-Driven New Construction Commissioning

Inefficiencies in the sequences of operation of a building automation system are a common problem for new buildings, particularly projects with complex equipment that rely heavily on automation systems.

The Building:

The Conrad N. Hilton Foundation completed construction of the first phase of its new headquarters in Agoura Hills, CA. The 24,000 SF facility exceeds LEED Platinum performance standards and is designed to be a net-zero energy building.

Challenge:

As an ultra-high performance building, the Hilton Foundation headquarters serves as a model for sustainable design and is expected to deliver performance. In order to operate this facility to its full potential and verify expected energy savings, the commissioning team and other project team members were tasked with crafting a method for gathering, analyzing, and acting on a constant stream of data from an array of building systems. Oftentimes, though, large amounts of data from multiple systems ends up being misunderstood, misinterpreted, and/or mismanaged.

Solution:

Altura team members who were responsible for leading and overseeing the commissioning process for the facility also led the deployment of SkySpark – an automated fault detection and diagnostics software which is customized to collect and analyze large amounts of data from building systems, and provide building engineers with meaningful and actionable data.

Results:

In the traditional approach of commissioning and opening of a new facility building engineers would have limited insight into building performance and system operational trends. Using the SkySpark platform, however, the project team was able to quickly uncover irregularities in systems performance and make changes. SkySpark provided speedy visibility into the performance of the buildings systems that is unparalleled by traditional automation system trend viewers and spreadsheet-based analysis. The live integration of SkySpark to the building systems provide the project team and owner with a permanent means for monitoring the performance of this LEED Platinum facility on an ongoing basis to ensure persistent net-zero energy performance and occupant comfort.

Contact:
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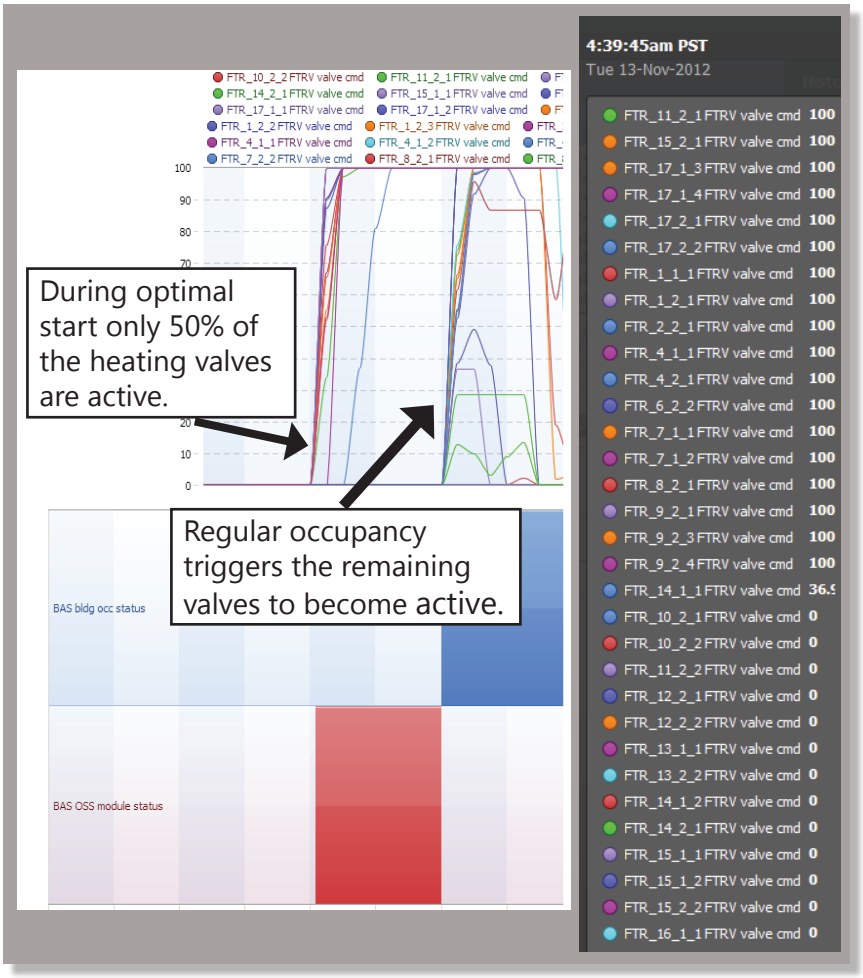
Example1: Granular issues identified visually in SkySpark:

In the following example, SkySpark was used to identify a missing linkage in the optimal start strategy used in the automation system.



Issue:

Inefficiencies in the sequences of operation of a building automation system are a common problem for new building, particularly projects with complex equipment that rely heavily on automation systems. Optimal start sequences require a period of time to learn how the building reacts on start-up in different weather conditions. Traditional one touch commissioning lacks the ability to fully test optimal start sequences during on-site testing. In this particular instance the building is unable to achieve comfortable temperature prior to occupancy during the optimal start-up morning warm-up sequence.

Resolution:

Using SkySpark, the commissioning agent and the project engineers have the ability to recall and analyze large amounts of data from building systems using meaningful filters that tease out the important trends. This allows the team to quickly identify the high-level irregularities, and drill down to the specific root of the problem. Using a historical data application in SkySpark the team is able to import and plot a constant flow of data from the building automation system. In this report a very granular level of detail for radiant heating valve positions is called. In minutes SkySpark has generated a plot displaying the valve position for every radiant heating valve in the building.

The report immediately makes apparent that precisely 50% of the valves do not open during optimal start. This information shed light on a small oversight in the automation system causing a big issue. By simply identifying this issue, the project team is able to quickly assess the situation, implement a fix, and track the results of the resolution by saving the plot as a report for future recall as more data is collected after implementation.

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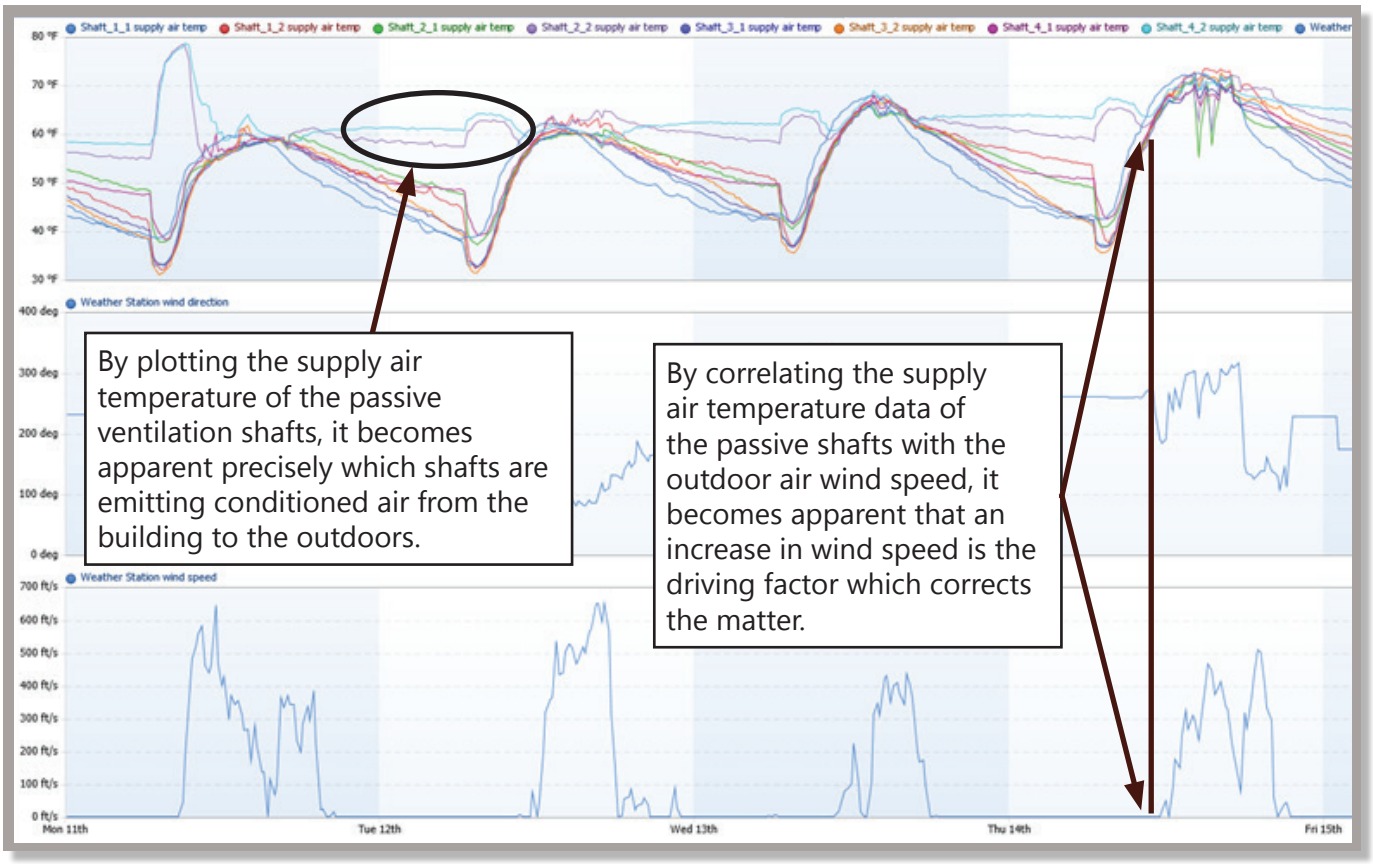
EXAMPLE 2: REVERSE PASSIVE AIR FLOW:

In an example from the ventilation system, SkySpark is used to identify instances where the passive ventilation system undergoes a reverse flow effect brought on by a lack of shaft airflow.

ISSUE:

Changing weather conditions have a dramatic effect on how passive building systems operate. Various factors, such as outside air temperature, wind speed, wind direction, and more can have an impact. In this case, it is found that some of the building's passive air shafts were allowing warm, conditioned air from the building to escape outside.



RESOLUTION:

SkySpark provides building engineers with the ability to analyze multiple streams of data at the same time, enabling the identification of cause and effect scenarios that occur with changing conditions. In this case, supply air temperature from each of the building's passive air shafts is plotted next to wind speed and wind direction data from an on-site weather station. It is determined that when wind speed increases, the shafts experiencing reverse air flow return to normal operation. This information is used to inform a revised automation sequence to prevent the reverse air flow condition from occurring. Again a report is saved and will be revisited to ensure correction of the issue after implementation of the new control sequence.

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