Achieving operational excellence

'The best sale of the day is energy efficiency'

By David Nieman, CEM with Mac-Donald Miller Facilities Solutions

David Nieman

When you hear the term "operational excellence," what comes to your mind? Do you have a clear vision of what it is? Or, better yet, do you have a clear understanding of what others think it is? If so, how do you measure it, foster it, and/or achieve it?

In today's economy, these are critical questions that have a direct effect on your bottom line. The answers to these questions have a measurable impact on the longevity of building systems. They also directly affect the overall cost of running your facilities, not only in terms of energy cost, but also in the life cycle of the equipment and tenant satisfaction and comfort.

Operational excellence is achieved when building systems meet the needs of the tenants or clients in the most cost-effective manner without sacrificing system reliability and performance. In addition, the building systems must react in such a way as to not negatively affect the comfort of the client or the needs of critical process loads.

Measuring Operational Excellence

Operational excellence is measured in a number of ways. If we fail in any one area, we fail completely.

• *The number of house calls, or service calls, received.*
If the building systems are not taking care of the customers' or building tenants' needs, the phone will indicate the problem. This is undesirable for many reasons. Ultimately, dissatisfaction with a facility will have a direct impact on releasing opportunities, and have a negative impact on lease rates. Moreover, this would obviously have a negative effect on profitability. Therefore, customer and tenant satisfaction is of the utmost importance.

• *The life cycle of building equipment and systems.*
When loads and stress are reduced on equipment, the life expectancy of the equipment is automatically increased. The longer the life, the greater the value added by proper care and operational strategies. If we decrease the run time on building systems by 30%, we automatically increase its life span by the same amount. This equates to adding six years to the life of a piece of equipment that was originally going to last 20 years. This not only defers the expense of replacement, but also of costly maintenance and repairs.

• *Energy savings, which inherently converts to dollars saved.*
One way to understand savings is to first understand the tempo at which your organization operates. In other words, how much money do you have to keep a system's power running? If the organization runs on a five percent margin, then for every dollar spent, five cents is made in profit. Compare that to a dollar saved. Every dollar saved goes directly to the bottom line. This means a dollar saved is the same as bringing in $20 in revenue! Therefore, the best sale of the day is to sell energy efficiency!

Financial Analysis

Most buildings can realize notable savings without major capital investments. Making minor experience-based control strategy changes can often yield a return on investment (ROI) in excess of 35% in as few as 16 months. Furthermore, these financial returns due to implementing energy efficient operating strategies inherently bring with them environmental benefits in the form of carbon footprint reductions.

In some cases the lack of functionality of the building automation system because of its age or deferred maintenance make a wholesale change out a more viable alternative than low cost improvements. In such dire situations, a financial appetite for projects with paybacks between 5-10 years is necessary.

Delivering the Results

Perseverance and persistence is the key. Ultimately, anything that is done needs to be measurable over the long haul. Typically, the collectable savings of energy efficiency measures are lost over time because changes are made to the system by operators to correct problems. Unfortunately, those incremental changes are not always done with consideration for how they might affect the entire system and ultimately can drive operating cost through the roof.

Persistence with operating strategies is necessary to achieve savings over the course of a facility's life. This requires a seasoned Certified Energy Manager (CEM), or Resource Conservation Manager (RCM), to verify that the building systems are operating as anticipated. Without this diligent oversight and accountability, it is highly unlikely that efficiency improvements will be sustained.

Performance management is the act, by a certified energy manager experienced in building operations, of gathering and evaluating system data to insure efficient operation and successful implementation of corrective action to identified problems.

It is a vital component to achieving and maintaining operational excellence.

Almost any facility can save energy. In fact, recent studies indicate that 42% of buildings that achieve a USGBC LEED rating fail to achieve their energy targets.

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Running building systems based on the original design criteria is not a cost effective operating strategy. Sequences of operation need to be updated and corrected over time to react to real world situations in a building. As such, performance management is an emerging field that requires an in-depth knowledge of building systems and operating strategies to achieve the goals of operational excellence.

How do we get a building to react to changes in the environment and still maintain low budgets with high tenant satisfaction? The key to successfully running a building efficiently is through load-based programming. The following examples provide an idea of the effects that can be achieved through proper performance management. They also illustrate how bad things can conceivably get, while going unnoticed in all areas except the power bills.

Figure 1 covers a period of one week. The black line indicates duct static pressure for an air handling unit (AHU). Initially, duct static pressure is running at about 1.5 inches of water column (IWC), according to the graph. The red line indicates outside air temperature (OAT).

Figure 1

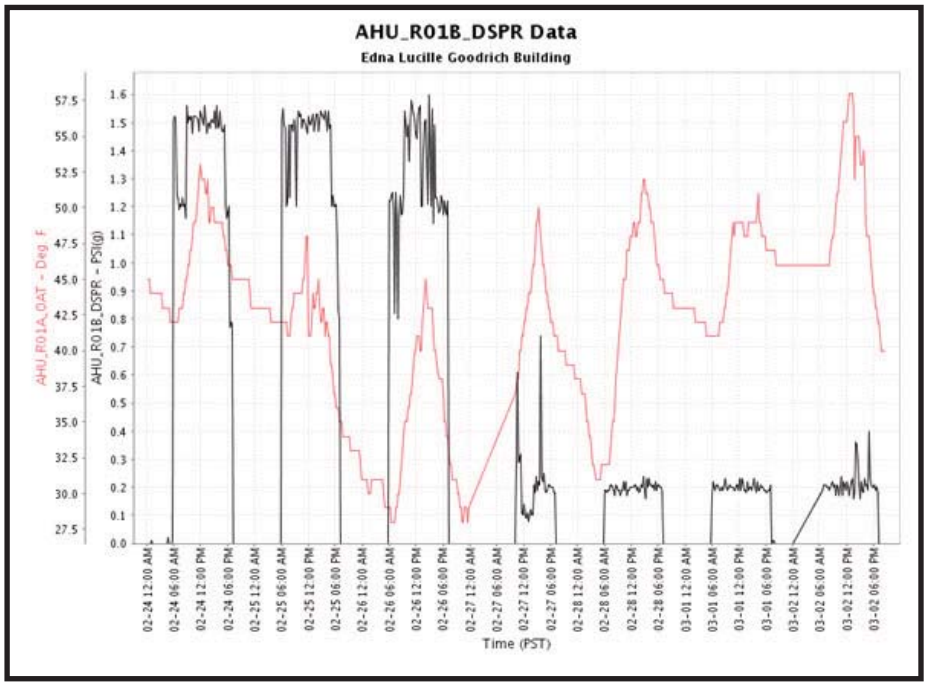
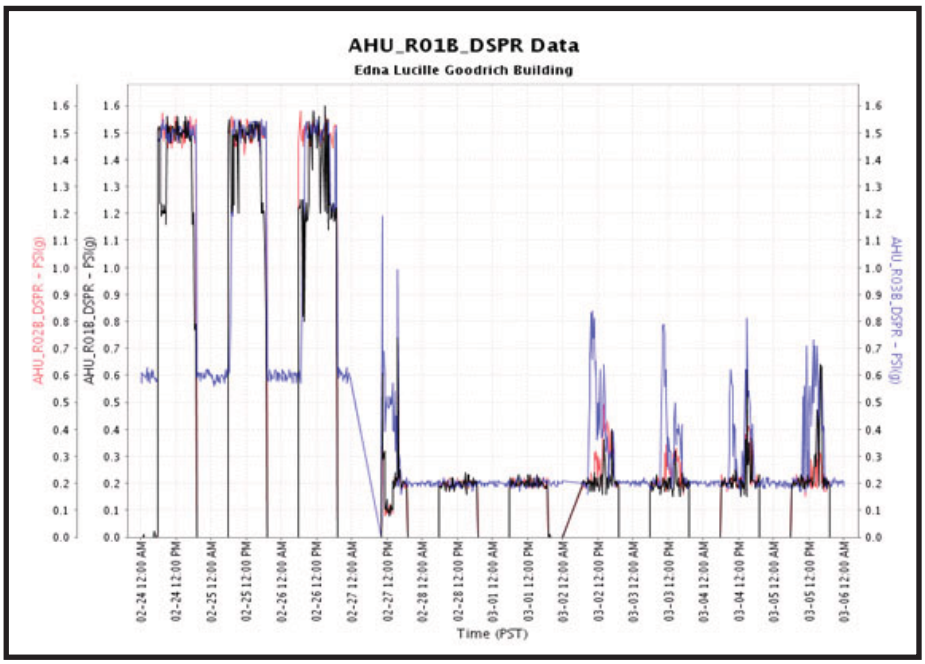


Figure 2



Notice that even though the temperature increases over the week, after proper programming is installed the duct static pressure stays low at about 0.2 IWC as it should be under low heat load. The changes were instantaneous and the savings dramatic. The fan is running at one-seventh of the previous pressure, and is maintaining proper air flow and temperature in the conditioned space. The rest was simply wasted energy.

Figure 2 illustrates the same fan increasing pressure as the heat load increases in the building. Notice that even with the increase in heat load, we are still not maxing out the fan pressure as we were before. We also added two more fans to the graph. All are running correctly. The changes in static pressure are in response to sun load, not the outside air temperature. No additional tenant complaints were experienced. The building is reacting as it should and saving a bundle in the process. Similar programming was done for discharge air temperature for the AHU'S and boiler resets, as well as global variable air volume (VAV) temp control. This is performance management at its best, getting a building control system to do what it was designed to do.

Achieving operational excellence is part art, but mostly science and attention to detail. Following the above recommendations will go a long way toward extending the lives of your facilities, while cutting energy and operational costs.

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