CSU Dominguez Hills
Welch Hall
Duct Cleaning MBCx

How the right tools in the right hands can yield significant, lasting energy savings
Project Overview

On the surface, the Welch Hall Duct Cleaning MBCx looks like a typical MBCx project, with a bit of extra technology. Major installed measures included:

• Duct cleaning, removing major blockages at the reheat coils
• Air balancing to correct flows once blockages were removed
• Installation of occupancy sensors, providing occupancy-based zone level air flow, temperature, and lighting controls
• Static pressure reset implemented for the building’s three primary variable volume air handlers
• Continuous monitoring software implemented alongside, to enhance and assist in the MBCx process and ongoing building health maintenance

So what stands out about this project?

• This is the **second** time this building was MBCx’d in the past 5 years, with significant savings for each iteration
The first go-round, completed in 2012, achieved a whopping 24% electrical savings, 31% chilled water savings, and 51% hot water savings.

Major Savings
Not Once, but Twice!

The recent duct cleaning MBCx achieved an additional 35% electrical savings, 35% chilled water savings, and 43% hot water savings over the post-project baseline for the 2012 project.
How Were Such Substantial Savings Achieved?

The following key factors helped the CSU Dominguez Hills and EnerNOC teams to build on the success of the first MBCx project and achieve substantial additional energy savings during the second MBCx project:

• Implementation of advanced, occupancy-based, zone level air flow, temperature, and lighting controls via Enlighted occupancy sensors
• Use of EcoVox continuous monitoring software to glean insights into the performance of the building systems and automated notifications when issues arose within the building
• Exemplary team involvement and engagement in the project, ensuring optimal function of new controls and maximizing energy savings
Advanced Occupancy Based Controls

Occupancy sensors were installed in selected zones and tied into the BMS, allowing for air flow and temperature set backs in addition to standard lighting controls. These occupancy-based set backs both reduced energy consumption at the zone level, and increased energy savings achieved by the (existing) supply air temperature reset and (new) static pressure reset at the air handling units by increasing the system-wide set back potential.
Continuous Monitoring Software - Verifying and Ensuring MBCx Results

Welch Hall AHU 1 June 2014
Fan speed varied 68-80%
Discharge air pressure maintained 1-inH₂O 24/7

Welch Hall AHU 1 December 2015
Fan speed varied 30-80%
Discharge air pressure reset throughout the day

Verify that savings continue over time.
Continuous Monitoring Software:
Reset Strategy Tuning Inadvertently Led to Economizer Override

Economizer Strategy was Fixed and Verified
Continuous Monitoring Software: Benefits of Analytics for MBCx Projects

• Ensure that commissioning strategy is implemented correctly and performs well over time.
• Catch unoccupied runtime of fans and mechanical units.
• Identify and calculate savings from energy efficiency projects.
• Automatically flag units that are not meeting set points, and compare performance over periods of time.

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<tr>
<th>Rules</th>
<th>dur</th>
<th>totalKWH</th>
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<tbody>
<tr>
<td>Equip Running Outside Occupancy</td>
<td>54.67hr</td>
<td>5,287 kWh</td>
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**Issue, Plus How Often, How Much?**

**When?**

**Which Equipment?**
Exemplary Team Involvement

Even with the latest technology and most advanced control sequences, achieving real and lasting energy savings depend on the engagement of the people who deal with the day to day operation of the building.

• It’s one thing to have the tools to “do it right”, but another thing entirely to use those tools to achieve sustainable and optimal results

• The CSU Dominguez Hills Facilities Services team made full use of the tools at their disposal (BMS, software, occupant feedback) to dial in the reset sequences and occupancy based controls:
  – Maximizing energy savings
  – Minimizing occupant complaints

• On an ongoing basis, this will allow the team to maintain the energy performance of the building through:
  – Deep understanding of the control sequences, allowing them to fine tune rather than override reset strategies when the building’s needs evolve
  – Avoiding “drift” due to failed sensors and components by using continuous monitoring software to stay on top things as issues arise
These guys make it happen!
There’s Always Something More You Can Do

- Install LED with Enlighted on every fixture so that all 190 zones can use unoccupancy set-back strategy.
- Replace all re-heat coil control valves with pressure independent valves.
- Convert Trane VAV boxes to VMA controls so there is no lag or disconnect in communications.
- Plug load monitoring and controls through Enlighted software and hardware.
- Economizer and discharge are temp control based on outside lumen levels along with OAT.
- Replace CHW control valves with Belimo Energy Valves. (Done 5/2016)
Thank You

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