AEE SoCal Chapter Meeting
“JPL Building 301 How Over 15% Reduction in Energy Use Was Achieved”
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What are Common Obstacles In Achieving Energy Reductions?

• Saying That Everything That Could Be Done Has
• No Feedback How Systems Are Operating
• Decoupling Comfort Complaints With Performance
• No Standards for Change of Use Within the Building
• Operating or Changing Set Points Manually
• Designing or Operating By Rules of Thumb
Building 301

- Project Formulation Building
- 170,000 Square Foot 4 Story Building
- (2) 250 Ton Chillers
- (2) 80,000 CFM 100-HP AHU’s that are interconnected
- (2) 30-HP AHU Return Fans
- 33 Fan Coil Units for High Load or Critical Areas
- Mixed Use building Offices, Labs, & Data Rooms
- Server Racks Everywhere Mixed In
Project #1 Chiller Replacement (2009)

- Electrical Consumption was over 3.7 Million kWh
- Served from a Central Cooling Tower (B315) with Primary-Secondary-Tertiary Constant Flow CW Pumping
- CHW was Primary Constant Flow
- Originally project was to add a Pony Chiller
- Convinced Honeywell & JPL to meter performance and instead replace the chillers.
Project #1 Chiller Replacement (2009)
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- (2) McQuay (Daikin) 250 Ton WMC’s
- VFD’s Added to CHW & Condenser Water Pumps
- CHW Converted to Primary Variable Flow
- The Decoupler was Removed from the CW
- CW was converted to Variable Flow Secondary Boosted
- All Operating Setpoints are Reset by Demand or Relation
- Project resulted in over 700,000 kWh in Savings
- CW of other buildings were Converted to Constant Flow Secondary Boosted By Maintenance Staff For Even More Savings to the Lab Not Claimed by this Project.
Project #2 Hybrid VAV & Controls Upgrade (2012)

- New study of energy projects on lab performed 2010-2011
- Found Rule of thumb sequences with the AHU and zones
- Enthalpy Economizer not operating correctly
- Chiller Plant operated 24-7 due to critical fan coil loads
- One AHU Ran 24-7 due to server additions
- During winter chiller plant cycles on/off even with a flywheel mode multiple times
Project #2 Hybrid VAV & Controls Upgrade (2012)

- System/Sequence Operates based on Demand
- Winter AHU operates 24-7 with Economizer for all loads
- Chiller plant cycles less in winter, on 10, off 40 minutes.
- Summer Time only Fan Coils operate at night….
- Until an unknown server with out a fan coil was found.
- Spaces cooler, was operating at 78 deg F, now 74 deg F
- Less Complaints
- Still more savings available
- VAV Reheat Coils Plugged, Reheat Valves Leak by
- Isolation dampers on AHU do not close off
- On track for about 800,000 kWh Savings
How to Serve Critical Spaces Efficiently

- IDF – Intermediate Distribution Frame (Typ. 0.5 to 2 Tons)
- BDF – Building Distribution Frame (2 to 10 Tons)
- MDF – Main Distribution Frame (5 to ? Tons)
- Typically IDF’s are served by Mini Spilts and VRF Systems
- Typically BDF’s are served by Ceiling Computer Rm Units
- Typically MDF’s are served by Floor Standing CRU’s

- Why?
How to Serve Critical Spaces Efficiently

• In the past controls were not accurate (8 bit A to D)
• 256 points of resolution vs. 4096 today
• Use hybrid solution for small to medium rooms
• Use dedicated AHU’s for Larger Rooms
  • Less internal DP
  • Hot Water Reheat
  • VFD Efficient Fans
  • Quieter spaces, more room inside the data room
  • Just as reliable
• Use External Adiabatic Humidifiers
Thank You!

Q & A

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