Ventilation Setbacks for Healthcare Facilities
Peer Exchange

March 24, 2015
2:00 PM - 3:00 PM EDT
(562) 247-8321
Access Code: 457-722-027
Overview and Agenda

- Welcome and Overview
- Ventilation Requirements & ASHRAE Standard 170
- How to Obtain Buy-In for OR Air Exchange Setbacks
- New York Presbyterian’s Experience with HVAC Setbacks
- Question & Answer Session
Presenters

Jeff Boldt
- Director of Engineering
- Voting Member 90.1 & 189.1
- Author AEDG Large Hospitals & Small HC Facilities
- Consultant to 62.1

Paul Slebodnik
- Director Facilities Management

Roberto Nunez
- Director Facilities Operations
Ventilation Requirements & ASHRAE Standard 170
Jeff Boldt, KJWW
VENTILATION REQUIREMENTS

- FGI-2010 and 2014
- ASHRAE 170-2008 and 2013
- ASHRAE 62.1/IMC
- Individual States
  - IA – FGI-2010
  - WI – FGI-2010 (ventilation only)
  - IL – IDPH
  - CA – OSHPD
VENTILATION REQUIREMENTS – ASHRAE-170 EXAMPLES

• **Patient Rooms**
  • 6 ACH Total – 2 ACH OA
  • 4 ACH Total in 170-2013
  • Unoccupied – 0 ACH is **implied** to be permitted in 170-2008 and 2013
  • OSHPD appears to allow reduction to 25%
VENTILATION REQUIREMENT – ASHRAE-170 EXAMPLES

• Operating Rooms
  • 20 ACH Total – 4 ACH OA
  • Unoccupied = maintain pressure relationships
  • Huge impact on surgery centers
  • OSHPD appears to allow reduction to 6ACH
  • Must be safe
CEILING HEIGHTS

• Most codes based on ACH
  • High ceilings can mean high energy
    • 150sf*8’ceiling*6ACH/60 = 120 cfm
    • 150sf*9.5’ceiling*6ACH/60 = 143 cfm

• 170 has special displacement ventilation provisions
  • Only count first 6’ in the volume
    • 150sf*6’*6ACH/60 = 90 cfm
    • Stayed at 6ACH and 6’ in 170-2013
VENTILATION REQUIREMENT – 90.1-2010/IECC-2012

- Zones for which the volume of air that is reheated, recooled, or mixed is less than the larger of the following:
  1. 30% of the zone design peak supply rate;
  2. The outdoor airflow rate required to meet the ventilation requirements of Section 6.2 of ASHRAE Standard 62.1 for the zone;
  3. Any higher rate that can be demonstrated, to the satisfaction of the authority having jurisdiction, to reduce overall system annual energy usage by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system.
  4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.
VAV IS MANDATED IN MOST 90.1/IECC HOSPITALS

• Example
  • Patient Room
    • $150\text{sf} \times 9\text{’ceiling} \times 6\text{ACH}/60 = 135\text{ cfm minimum}$
    • Cooling load = 250 cfm
    • 90.1/IECC permits reheating only 135 cfm

4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.
VAV IS MANDATED IN MOST 90.1/IECC HOSPITALS

• Example
  • Operating Room
    • 400sf*10′ceiling*20ACH/60 = 1,333 cfm occupied
    • Unoccupied flow to maintain 0.01″ = 400 cfm
    • 90.1/IECC permits reheating only 400 cfm when unoccupied

4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.
DOAS

- Minimizes Reheat
  - Often near heat balance

- Geothermal + DOAS
  - Majority of savings are from DOAS & Heat Pumps
DEMAND CONTROLLED VENTILATION (DCV)

• Highly Variable Occupancies
  • Conference Rooms
  • Dining Rooms
  • Lecture Halls

• Normally Not Regulated by Std. 170
  • Math is complex, except in CA or for single-zone systems
• Save lighting energy
• Save much more HVAC energy
• No beam of halogen light heat
• Staff turns up the thermostats
• Maintaining 60% maximum RH is much easier
RETROFIT – SURGICAL LIGHT EXAMPLE

• 1 Operating Room
• Halogen Exam Light
  • Lighting 250 W (each)
  • HVAC (60°F @ 60% RH = 45°F dew-point) = 19 kW
• LED Exam Light
  • Lighting 65 W (each)
  • HVAC (65°F at 60% RH = 50°F dew-point) = 13 kW
• Savings
  • Lighting = 370 W (two lights)
  • Ventilation = 6,000 W
How to Obtain Buy-In for OR Air Exchange Setbacks
Paul Slebodnik, Cleveland Clinic
How to Obtain Buy-In for OR Air Exchange Setbacks

March 24, 2015

Paul Slebodnik – Director Facilities
What’s the Big Deal?

- **Surgical Perspective**
  - Safety – Impact on Infection Rates
  - Comfort – Surgical Team

- **Administration/Facilities**
  - Tasked with $12 mm in utility savings
  - This is one of the largest single opportunities
  - Provides an opportunity to standardize the OR look and feel
Figure Out How to Control It

• Determine how to activate patient occupancy mode
  - Light switch
  - RFID
  - Occupancy Sensor
  - Fixed Schedule
  - Daily Schedule

• Determine how to activate set-back

• Emergency Situation
  - Over-ride
  - Special rooms (no set-back)
Obtain Infection Prevention Buy-in

- Share that existing conditions not optimal
  - After hours
  - Current in-room information
  - ACH monitoring not in all OR’s
- Present that this is not a new concept
  - Washington state in 1986 standard practice
  - ASHE recognizes it as a best practice
  - Other major HC systems are doing it
- Reiterate
  - Relative pressure relationships are maintained
  - Temperature and Humidity maintained
Obtain Approval from Surgical Executive Committee

- Present it as the benefit to quality it is
  - Improved oversight
    - Continuous monitoring (w/ alarms)
    - Temp/Humidity/Pressure/ACH
    - In-room visibility of all 4 (consistent with BAS)
    - Surgical control desk has visibility
  - No human intervention required
  - Visible indication if not at 20 ACH (red “pill”)
  - Audible alarm if system fails
- Provide prototype to see & ask questions
Present Status

- Setbacks have been utilized in some of the regional hospitals for a while
- IP endorsement has been given
- Surgical Executive Committee has agreed to move forward
  - Prototypes are installed in two OR’s but are only being used to show condition status
  - Sequences have been written
  - Two OR re-cap are putting in the equipment
- Final approval of funding is being presented today
Cleveland Clinic

Every life deserves world class care.
New York Presbyterian’s Experience with HVAC Setbacks
Roberto Nunez, New York Presbyterian
Ventilation Setbacks for Healthcare Facilities
NewYork Presbyterian Facilities

Total NYP +12 million sq ft

Gross Building Area (MM)

- Royal Charter: 3,516,308
- Columbia Presbyterian: 3,889,181
- Weill Cornell: 2,971,874
- Westchester Division: 602,980
- Lower Manhattan Hospital: 340,155
- Allen Hospital: 299,881
- Offsite Locations: 736,344

Empire State Building: 2,768,591
Energy Goals

NYC Mayoral Sustainability Challenge
- PlaNYC – Reduce greenhouse gas emissions by 30% from 2005 levels by 2018

Department of Energy – Better Buildings Challenge
- Reduce EUI by 20% by 2020 from 2011 baseline.

Energy STAR Portfolio Manager
- Achieve Energy STAR label
- Achieve Partner of the Year – Sustained Excellence in Energy Management
- Reduce Kbtu/SF by 2% from prior year

Healthier Hospital Initiative – Practice Greenhealth
- EUI Reduction of 3% from 2012 by 2015
Awards and Recognitions

- **ASHE Energy to Care** 2014 Recognition - Enterprise wide +10% EUI reduction since 2009
- **4 - ENERGY STAR** Partner of the Year Awards (2005-2008)
- **6 - ENERGY STAR** Sustained Excellence in Energy Management (2010-2015)
- **ENERGY STAR** Climate Communications Award 2014
- **NYP/TAH ENERGY STAR** Certified Building 2014
- **NYP/TAH Practice GreenHealth Environmental Excellence** Award for Energy.
- **NYP/WD Westchester Green Business Challenge** Certification 2014
ASHRAE Standard 170 vs NYC DOB Code

- ASHRAE Standard 170 increased the ACH requirements for operating rooms to 20.

- NYC DOB requires operating rooms to operate at 25 air exchanges if a 100% outdoor air unit is not utilized.

- 100% outdoor air is NOT recommended if you are looking for energy savings.
Building Automation

- Building Management System (BMS)
- Used to monitor and control ventilation in all critical and non-critical areas
- Tightens controls on all air handling units and variable air volume boxes
- Better temperature and pressure controls with less energy consumption
Building Automation

- Tighter controls on air handling unit operations
- Operate at required outputs without exceeding set-points
  - Prevents excessive energy consumption and wear on units
  - Prevents drifts below required set-points to keep operating rooms compliant.
Building Automation

- Remotely monitor, control, and log:

  - Room Temperature
  - Damper Position
  - Reheat Valve Position
  - Room Pressure
  - Temperature Discharge @ VAV Box
  - Humidity
  - CFM Discharge
  - Air Exchange Rate
Taking advantage of Night Setback and Occupancy Sensor

- Limited opportunities for energy savings during normal operation
- During off-hours- Temperature and Static Set-points for are automatically changed through the BMS.
- Near Future- Utilize occupancy sensors to reduce Operating Room set-points to night setback when not in use.
Q & A
Join us at the Better Buildings Summit

Registration is now open!

**WHO:** 800+ Better Buildings partners and stakeholders and nearly 200 speakers will share demonstrated and proven solutions.

**WHAT:** 2 ½ days of sessions and meetings focused on the sharing of the most successful energy efficiency strategies. There will be plenty of time for attendees to ask questions, network, and exchange new ideas.

**WHEN:** May 27-29, 2015

**WHERE:** Washington D.C.

It only happens once a year, so don’t miss it!

**Quick links:**
- Agenda at-a-glance
- Register today
- Reserve your hotel room

Learn more: [energy.gov/betterbuildings/summit](http://energy.gov/betterbuildings/summit)
Additional Questions? Feel Free to Contact Us

eere.energy.gov/betterbuildingsalliance

<table>
<thead>
<tr>
<th>Today’s Presenters</th>
<th>DOE Program Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Boldt</td>
<td>Michael Deru</td>
</tr>
<tr>
<td>KJWW</td>
<td>Space Conditioning Team Lead</td>
</tr>
<tr>
<td><a href="mailto:boldtjg@kjww.com">boldtjg@kjww.com</a></td>
<td><a href="mailto:Michael.Deru@nrel.gov">Michael.Deru@nrel.gov</a></td>
</tr>
<tr>
<td>Paul Slebodnik</td>
<td></td>
</tr>
<tr>
<td>Cleveland Clinic Foundation</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:Pasleb@ccf.org">Pasleb@ccf.org</a></td>
<td></td>
</tr>
<tr>
<td>Roberto Nunez</td>
<td>John Jameson</td>
</tr>
<tr>
<td>New York Presbyterian Hospital</td>
<td>Healthcare &amp; Higher Education Account Manager</td>
</tr>
<tr>
<td><a href="mailto:ron9014@nyp.org">ron9014@nyp.org</a></td>
<td><a href="mailto:John.Jameson@icfi.com">John.Jameson@icfi.com</a></td>
</tr>
</tbody>
</table>

Thank You!