Retro-commissioning for Resiliency and Code Compliance
Introduction

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What is Retro-commissioning

- Proactive vs. Reactive
  - Surveying
  - Identifying scope for projects
  - Addressing regulatory compliance issues
- Constant Change in Buildings
  - Systems designed on assumptions
  - Unforeseen conditions
  - User group and programming changes
Retro-commissioning challenges

- Facilities and capital department synergy
- User group and access coordination
  - Methodical testing plan
  - Off-hours testing
  - Educating user groups on process
- Measurement and data acquisition
  - Controls
    - Challenges of pneumatics
    - Sensor calibration/reliability
    - Point mapping
- Scope control
Retro-commissioning benefits

- Regulatory compliance
- Resiliency
- Maintenance
- Energy usage
- Capital Planning
Benefits - Regulatory Compliance

- Preparation for JCA and CMS inspections
- JCA and CMS Violations commonly occurring in facilities related to building MEP systems
- Actionable risk management plans
- Pharmacies
- Infection control

The 4 Most Prevalent Sources of Healthcare Associated Infections

- Surgical site infections 33%
- Ventilator-associated pneumonia 31%
- Bloodstream infections 18%
- Gastrointestinal illness 15%

Benefits - Regulatory Compliance

- Identify issues before they are caught by regulatory authorities
- Identify issues that could have a financial impact via claims
- Proactive commissioning

- Average retro-CX cost range that includes custom AHU, 8 sets of OR air valves -
  - $9,000 - $12,000

<table>
<thead>
<tr>
<th></th>
<th>Studies</th>
<th>Ranges of Estimates</th>
<th>Estimate (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infections</td>
<td>5</td>
<td>$11,778–$42,177</td>
<td>$28,219 ($18,237–$38,202)</td>
</tr>
<tr>
<td>Ventilator-Associated Pneumonia (VAP)</td>
<td>5</td>
<td>$19,325–$80,013</td>
<td>$47,238 ($21,890–$72,587)</td>
</tr>
<tr>
<td>Adverse Drug Events (ADE)</td>
<td>2</td>
<td>$1,277–$9,062</td>
<td>$5,746 ($-3,950–$15,441)</td>
</tr>
</tbody>
</table>

Benefits - Resiliency

- Generator outage simulation
  - SOP for loss of power
    - Critical spaces
      - ORs
      - Isolation Rooms
  - Clinical Staff training
    - Plug loads
Benefits - Resiliency

- Temperature and humidification control contingency plans
- Cross-ties and re-directing air distribution
- Testing of redundancy operations
Benefits - Maintenance

- Broken equipment
  - Actuators
  - Damper vanes
  - Valve seating/leak-by
- Identifying custom programming
- Calibration of sensors
- Filter and strainer conditions
Benefits - Energy Usage

- Identifying high energy use equipment
  - Recommission to reduce usage
- Can increase energy use
  - Systems operating not as designed or needed
- System operation deviations over operating life
  - Control tuning
  - Part failures
  - Calibration
- Common sequence failures
  - Economizer
  - Humidification/dehumidification
Energy Usage

- Typical Operating Room Air Handler
  - 20 ACH Supply Air
  - 4 ACH Outdoor Air
  - $66,000/year

- Simulated Controls Failure
  - 0 ACH Outdoor Air
  - 8 ACH Outdoor Air
  - 12 ACH Outdoor Air
  - 0 ACH - $65,000
  - 8 ACH - $67,500
  - 12 ACH - $69,000
Benefits - Patient Comfort

- Thermal comfort
  - Tuning
  - Comfortable temperature
  - Adjustments in controls strategy to respond to real world conditions
- Indoor air quality improvements
  - Minimum outdoor air requirements for ventilation, adjustments per code changes
Benefits - Healing Environment

- Culture for most hospitals
- Poor vs high performing HVAC systems
- Acoustical comfort
  - Noise from air velocity or failing equipment
- Lighting
  - Control systems
Benefits - Capital Planning

- Planned system and equipment replacements
  - Creating a recommendations matrix for systems improvement
  - Prioritization of matrix based on priority and manageable project sizes
  - Developing term contract work from recommendations matrix
  - Utilize recommendations matrix to develop design narratives and RFPs
- More efficient use of facilities staff time
  - Less time chasing calls and complaints
  - Able to focus on preventative maintenance

<table>
<thead>
<tr>
<th>Item Number</th>
<th>System</th>
<th>Unit ID</th>
<th>Priority</th>
<th>Description of Issue</th>
<th>Recommendation for system improvement</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>AHU</td>
<td>AHU-3</td>
<td>1</td>
<td>Outdoor damper actuator is stripped from damper linkage. Unit operating with outdoor air dampers completely closed.</td>
<td>Actuator set screws should be adjusted/reapired to properly drive dampers to provide required outdoor air.</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>AHU</td>
<td>AHU-1</td>
<td>2</td>
<td>1/3 steam heating valve is experiencing leaking by, causing a slightly elevated discharge temperature.</td>
<td>Steam valve should be reseated at zero and preload adjusted.</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

- Address the under utilization of retro-commissioning by working with your commissioning agent to identify scope and approach
- Overcome challenges associated with getting retro-commissioning projects off the ground by integrating with multiple owner departments
- Data is the key tool for capital and operation’s planning decisions
- Retro-commissioning can be used to help prevent Joint Commission Inspection failures
- Retro-commissioning impact on energy usage may not always meet the expected outcome
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