



# Case Study: Existing Building Commissioning at Long Island University Pratt Recreation Center

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*Demand a Higher Standard<sup>SM</sup>*

# Firm Profile



- Established in 1995
- 90+ employees and 8 offices
- LEED Accredited Professionals
- Certified Commissioning Professionals
- Leaders in the BCA



# Pratt Recreation Center



- Built in 2002
- \$18 million
- 77,000 sf
- 3,000 seat gymnasium
- 3 full sized basketball, volleyball and badminton courts
- Jogging track, swimming pool, racquetball and fitness rooms



# Commissioning



- HEA provided new construction Cx in 2002 on all MEP and fire protection systems
  - Design build contract
  - No design phase CX used
- Cx identified approximately \$44,000 in annual energy savings by detecting and correcting system deficiencies
- Payback on Cx was 6 months, with NYSERDA and LIPA funding 33% of Cx fee each
- Effective training of operations staff reduced equipment run-time and decreased operating costs and wear of equipment

# Cx Re-visited in 2008



- Five years later, LIU hired HEA to Re-Cx the facility
- LIU believes in the benefits of Cx and wanted a comparison between how the building is operating now to what it was operating then
- LIPA funded the Cx fee under their Existing Building Cx program

# Cx Re-visited in 2008



- Issues were broken down into:
  - Not operating as intended
  - Controls issues
  - Operations issues
  - Maintenance issues
- “If a tree falls in the forest does anyone hear it?”
- If nobody is complaining is a system not functioning?

# Cx Re-visited in 2008



- HEA interviewed the operations team
  - Building operating parameters were similar as they were in 2002
  - Minor changes were discovered

# Cx Re-visited in 2008



- HEA used the old checklists and functional testing data to retest the existing facility
- We then performed functional testing after the building performed some minor PM work

# Cx Re-visited in 2008



- The issues we found.....

# Key Controls Deficiencies



- Controls issues would be
  - Scheduling
  - Calibration
  - Communication, etc.

# Key Controls Deficiencies



- Scheduling of the buildings RTU's
  - Schedule was programmed from 6am-12am
  - Units operated 24 hrs
  - The space is open from 7am to 10pm
  - Adjusting the schedule and making the system work as intended saves \$
  - Repairing scheduling would result in savings of approximately \$8,700/yr

# Key Controls Deficiencies



- False high temperature reading from VAV
  - Unit compressors ran continuously
  - Reduces operating life cycle of compressor
  - \$8,000/yr in energy costs could be saved

# Key Controls Deficiencies



- Outside air temperature sensors were not calibrated
  - False enthalpy readings and limiting initiation/duration of economizer mode
  - Force unit to utilize mechanical heating and cooling resulting in additional energy usage
  - Approximately \$3,600/yr could be saved in energy costs by utilizing economizer mode

# Key Controls Deficiencies



- Economizer cycles not calibrated
  - O.A. / R.A. dampers not scheduled correctly
  - Enthalpy locations on O.A. not on return air
  - Outside air sensors not calibrated
  - Some RTU's were locked out locally of economizer cycle

# Key Controls Deficiencies



- Poor communication between two control systems
  - Trane controlled the space
    - No head end at the space and plug and play required
  - Andover is the main frame
    - BACnet was limited to data acquisition only

# Key Controls Deficiencies



- Poor communication leads to.....
  - Manual switch over to summer to winter mode
  - Operations personnel having to go out to the field to troubleshoot instead of at the BMS
    - Leads to poor response time (physical)
    - Takes them away from their current duties etc.

# Key Maintenance Deficiencies



- Compressor circuit is undercharged on RTU-1 and RTU-6
  - Compressor runs continuously
  - System being undercharged and running when building may have no load leads to extreme icing on the evaporator coils in the RTU
  - Undercharged refrigeration systems lead to less efficient compressor operation
  - Lowers overall efficiency of system by 12% and will shorten life of compressor

# Key Maintenance Deficiencies



- Exhaust Fans 14 & 15's fan belt was broken
  - Motor was operating with no belt attached
  - Energy is being used with no HVAC system impact
  - No complaints, no fallen trees

# Key Operational Issues



- Operational issues:
  - Tripped circuit breakers on an RTU
  - Short cycling of a compressor
  - Inoperable system alarms
  - Compressor delays not programmed
  - VAV's set at 0% open on minimum
    - Effects air changes
  - VAV's set at 85% open at maximum
    - Set points were consistently below target

# Key Operational Issues



- Lead to non energy impact
- Poor occupant comfort
- Have effect of operations and life of equipment

# Benefits



- Operational issues
- Occupant comfort
- Awareness to the issues that plague the building
  - Poor communication
- Maintenance issues

# Benefits



- The fallacy it's poor PM
  - “A tree fell?? Where???”
  - With time and effort all problems can be repaired
    - Who has the time?

# Benefits



- Benefits of Re-Cx were tremendous
- Total savings were approximately \$29,000 per year
- Payback for Cx achieved in 7-8 months

