Introduction To Retro-Commissioning

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NEBB

INCLUDING

NFM&T CONFERENCE/EXPO

Maintenance SOLUTIONS NATIONAL EXPO

GREENTech conference & exposition

SAFE BUILDINGS EXPO

Topics of Discussion

- Definitions
- Expectations
- Process Procedures
- Tools of the Trade
- Markets

Definitions

- **Commissioning Process:** A quality-focused process for enhancing the delivery of a new project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements. (ASHRAE, modified)

Definitions

- **Re-Commissioning (Re-Cx):** An application of the Commissioning Process requirements to a project that has been delivered using the Commissioning Process. This may be a scheduled re-commissioning developed as part of an Ongoing Commissioning Process, or it may be triggered by use change, operations problems, or other needs. (ASHRAE)

Definitions

- **Retro-Commissioning (Retro-Cx):** The Commissioning Process applied to an existing facility that was not previously commissioned. The same basic process as Cx needs to be followed from Pre-Design through Occupancy and Operations to optimize the benefits of implementing the Commissioning Process philosophy and practice. (ASHRAE)
- **Retro-Commissioning (RCx);** A process utilizing the concepts of building commissioning applied to existing facilities that have not been commissioned. (NEBB)

Retro-Cx Definition

- Retro-Commissioning (Retro-Cx) is the systematic process by which the Owner ensures that the building and systems are optimized to perform interactively to meet the current operational needs as closely as possible. This may include remedial design and construction to accomplish this goal.

Retro Commissioning Purpose

Deliver Solutions that are Meaningful to the Owner

RCx Meaningful Solutions

Solutions should

- ✓ Result in an improvement in the Owner's Business Operation;
  - ✓ Lower Energy
  - ✓ Higher Occupant Satisfaction
  - ✓ Lower Maintenance Costs
  - ✓ Risk Management

RCx Process Structure

- Understand the Owner's Needs
- Conduct an Effective Building/Systems Analysis
- Develop Recommendations that Lead to Solutions
- Deliver Solutions

RCx Meaningful Solutions

Effective Recommendations should

- ✓Have Identifiable Cost
- ✓Have Measurable Benefit
- ✓Deliver a Solution to the Owner

RCx Meaningful Solutions

Effective Recommendations may be

- ✓ A combination of corrective actions that solve a cost, maintenance or performance issue for the Owner.

How is Retro Commissioning Applied?

Retro-Commissioning

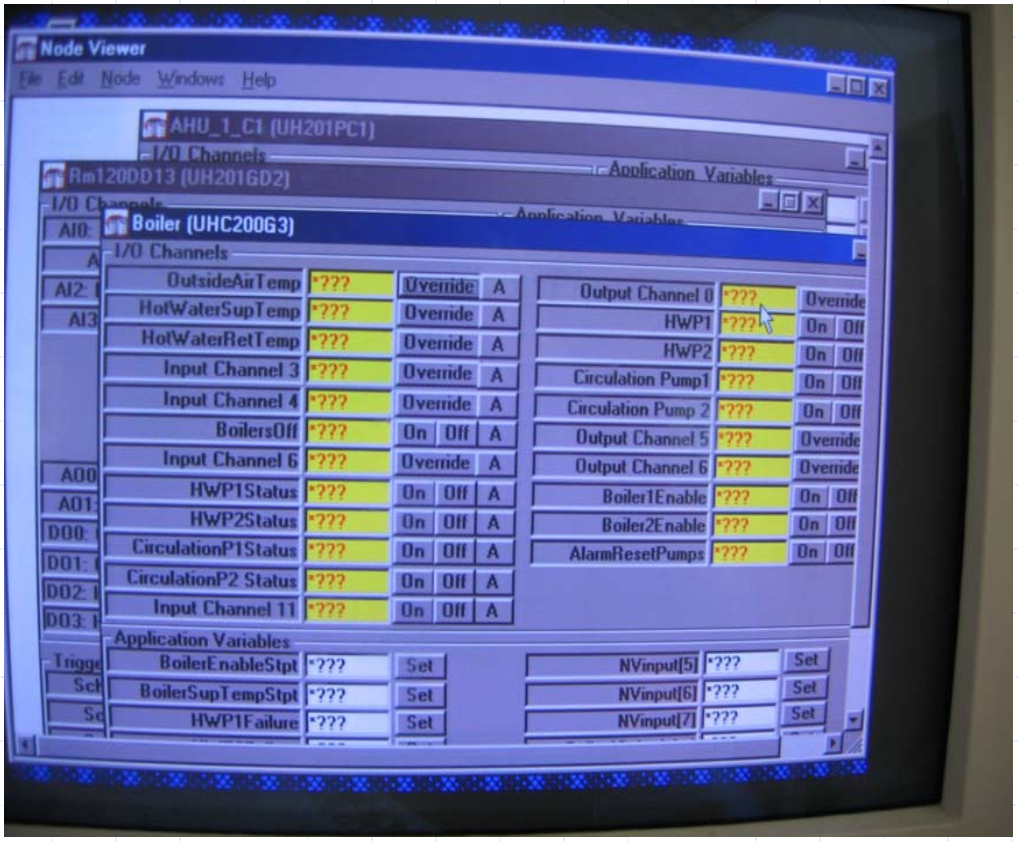
- Existing Buildings
- Contract between RC_X and Owner
- C_X performs tests and documents results
- Shall Include 'Quick Fixes' (if included in RCx Contract)
- May include:
  - Remedial Design
  - Remedial Construction
  - Commissioning of the Remedial Construction

Retro-Commissioning

- Systematic Process
- Identify AND CORRECT ALL THE PROBLEMS, Not The Symptoms!
- Solutions Are Holistic In Nature
- Maintenance Staff Training

Retro-Commissioning

- Systems Retro-Commissioned:
  - HVAC
  - Controls
  - Electrical
  - Elevators
  - Plumbing
  - Roofs
  - Envelope



Why Retro Commission?

Reasons for Retro Cx

- Fix the ‘Unfixable’
- Improved Occupant
- Productivity and Comfort
- Improved Energy Efficiency

Reasons for Retro Cx

- Reduced Liability
- Improved Regulatory Compliance
- More Effective Building Operators

RCx Market Drivers

- Poor Performance (Unhappy Tenants)
- Energy Savings / Energy Optimization
- LEED-EB

Retro-Cx Features

- Holistic Approach To Problems
- Deals Directly with Issues, Not Symptoms
- Setup To Meet Current Operations
- Staff Training
- Occupant Relationships

RCx Process

- Contract Phase
- Pre-Site Investigation Phase
- Site Investigation Phase
- Analysis & Synthesis Phase
- Corrective Action Phase

RCx Process

- Contract Phase
  - Building Walk-thru
  - Assemble Team
  - Proposal

RCx Process

- Pre Site Investigation Phase
  - RCx Plan Development
  - RCx Kickoff Meeting
  - Document Procurement & Review
    - Drawings & Specifications
    - O&M Manuals
    - TAB Reports
    - Utility Bills
    - Maintenance, Repair & Replacement Orders
  - Interviews
    - Management
    - Maintenance Personnel
    - Occupants

RCx Process

- Site Investigation Phase
  - Systems Review
  - HVAC Equipment & System Assessment
  - Building Envelope
  - Controls Systems
  - TAB
  - IAQ
  - Electrical Equipment & Systems
  - Plumbing Equipment & Systems

RCx Process

- Analysis & Synthesis Phase
  - Problem Analysis – Identification of the issues
  - Problem Synthesis – Resolution of issues
  - Recommendations
    - Report Preparation
    - Presentation of Corrective Action Report

RCx Process

- Corrective Action Phase
  - Remedial Design
  - Construction
  - Commissioning
- Follow Up Phase
  - Lessons Learned
  - Performance Verification

RCx Process

- Retro-Commissioning Matrix $\underline{\Phi}$

TOOLS OF THE TRADE

RCx Instrumentation

- Minimum instrumentation includes all TAB Instrumentation, (as digital) plus,

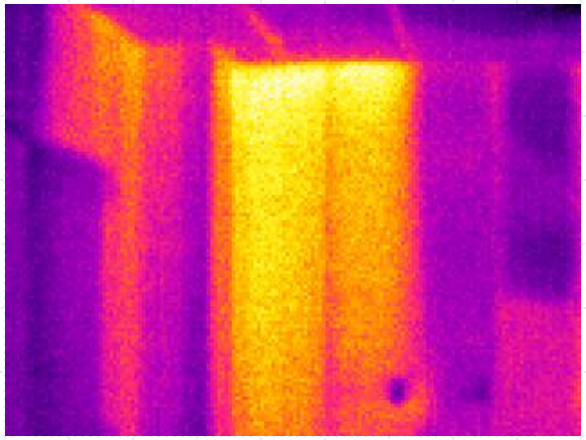
- RCx Instrumentation

RCx Instrumentation

- Data Loggers
  - Temperature/Humidity
  - Air Pressure/Water Pressure
  - CO_2 / CO
  - Lighting
  - Event
  - Analog Inputs

RCx Instrumentation

- Digital Camera
- Infrared Thermometer



Recommended RCx Instrumentation

- Thermal Camera
- Fiber Optic Scope
- Salt Bath Calibrator

RCx Marketing

RCx Market Drivers

- Poor Performance (Unhappy Tenants)
- Energy Savings / Energy Optimization
- LEED-EB

Customer with multiple buildings

- Federal Government
- State Government
- Municipalities
- Universities
- K-12 School Districts
- Health Care

Customer with multiple buildings

- Customer must have a critical interest in his building indoor environment and its energy costs
- Customer must be a long term owner
- Customer must understand true cost of facility

Existing Market (1995 Census)

- 69.926 Billion Square Feet
  - Government 15.124 Billion Sq Ft
  - Health Care 2.333 Billion Sq Ft
  - Office 12.319 Billion Sq Ft
  - Other 40.150 Billion Sq Ft

Existing Market (1995 Census)

- $66.549 Billion for Electricity
- $45.097 Billion for Gas
- $13.218 Billion for Fuel Oil
- $3.393 Billion for Propane
- $137.213 Billion Total energy costs
  - $ 1.96 per square foot average costs
  - Lowered to $1.50 per sq ft = $32.165 Billion saved or 23.4%
  - To become energy neutral USA needs to reduce energy consumption by 30%

Retro-Commissioning

Questions????