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COMMISSIONING/RETRO-COMMISSIONING & ENERGY AUDITS

PERCEPTION vs. REALITY

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RS&H
IMPROVING YOUR WORLD

Discussion Topics

- Commissioning (Cx) & Retro-Commissioning (RCx)
 - What it IS & IS NOT
 - Objectives & Benefits
 - Systems, Providers, & References
 - Cx & RCx Process
- Energy Audits / Surveys
 - Process & Benefits



The Commissioning Process

"The Commissioning Process is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meets defined objectives and criteria."

-- ASHRAE Guideline 0-2005:
The Commissioning Process



What is Cx? RCx? ReCx?



- Commissioning is performed specifically to ensure that the finished facility operates in accordance with the owner's documented project requirements (OPR) and the construction documents (BOD).
- Retro-commissioning is the commissioning process as applied to an existing facility that has never been commissioned. Focus is on building performance and how to improve utility/energy consumption.
- Re-commissioning is the commissioning process as applied to an existing building that had been commissioned but no longer meets owner's current operational need.



What Cx / RCx IS NOT!



- Construction Administration / Quality Control
- Bunch of Tests at the end of Construction
- Maintenance Contract
- Energy Audit / Study



Objectives of Cx / RCx

- Implement Quality-Verification Practices for Design & Construction
- Ensure that the Owner's Project Requirements (OPR) are Being Met By the Designer's Basis of Design (BOD)
- Provide Documentation & Tools to Improve Quality of Deliverables
- Verify Coordination Between Owner, Designers, and Builders
- Verify and Document that Building & Integrated Systems Perform Properly
- Verify that O&M Staff are Trained
- **ENSURING THE OWNER GETS WHAT THEY PAID FOR!**



Benefits of Cx / RCx

- Higher Quality Product that Leads to Better Owner Reputations
- Confident O&M Staff in Maintaining Facility
- Budget Savings in Capital & Operations
- Healthy Building which Improves Occupant Productivity
- **Less Conflicts / Litigation**



Cx / RCx Systems

- HVAC system and associated controls
- Electrical lighting and power
- Plumbing systems
- Building envelope
- Renewable energy systems
- Refrigeration systems
- Industrial process system
- Life safety & fire protection systems
- Security systems
- **JUST ABOUT ANYTHING!**



What is a Certified Cx / RCx Provider?

- Certified Building Commissioning Professional (CBCP) - AEE
- Commissioning Process Management Professional (CPMP) - ASHRAE
- Commissioning Authority (CxA) – ACG
- Certified Commissioning Provider (CCP) – BCA
- Commissioning Accredited Professional (CxAP) – University of Wisconsin Madison
- Qualified Commissioning Administrator (QCA) – NEBB
- Certified Commissioning Supervisor (CCS) - TABB



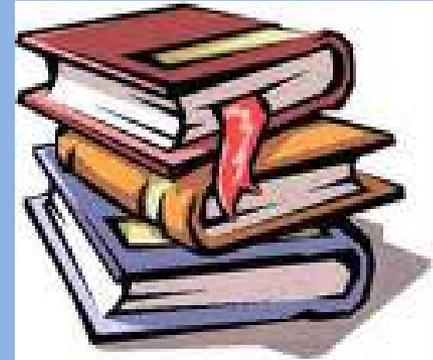
Qualified Cx / RCx Provider Attributes

- Ability to Work with Multi-Disciplined Team
- Good Communicator / Diplomat
- Organized
- Ample Field Experience
- Understanding of the A/E and Contractor Requirements
- Ability to Define Optimal Operating Procedures for Building Systems



Cx / RCx References

- ASHRAE Guideline 0-2005
- ASHRAE Guideline 1.1-2007 (replaced 1-1996)
- ACG Commissioning Guideline
- NEBB Procedural Standards for Building Systems Commissioning
- SMACNA HVAC Commissioning Guideline
- Portland Energy Conservation, Inc. (PECI)
- ***NUMEROUS OTHERS!**



The Commissioning (Cx) Process

The commissioning process involves activities that are integrated into every phase of the project . . .

PROGRAM

DESIGN

CONSTRUCTION

ACCEPTANCE

WARRANTY

NOT CONSTRUCTION ADMINISTRATION!

NOT JUST TESTING AT THE END!

The Retro-Commissioning (RCx) Process

The retro-commissioning process involves activities that are integrated into every phase of the project . . .

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

NOT A MAINTENANCE CONTRACT!

NOT JUST AN ENERGY STUDY!

Retro-Commissioning: Pre-Planning Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

- Identify Possible Candidate Buildings
- Collect Utility Data & Evaluate
- Generate Energy Star Portfolio Manager Energy Performance Rating
- Select Candidate Building(s)
- Define Project Goals & Objectives (OPR)



Retro-Commissioning: Planning Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLMENT

HAND-OFF

- Perform Facility Interviews & Walk-through
- Confirm Project Goals & Objectives (OPR)
- Submit Draft RCx Plan for Owner Review
- Submit Final RCx Plan



Retro-Commissioning: Investigation Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

- RCx Plan Presented to Key Facility Staff
- Conduct In-Depth Building Investigation
- Submit Findings Log & Energy Savings Calculations to Owner
- Owner Selects Energy Conservation Measures to Implement
- Submit Final RCx Investigation Report w/ Recommended Implementation Measures



Retro-Commissioning: Implementation Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

- Submit Implementation Plan (similar to Cx Plan)
- Energy Conservation Measures & Improvements are Made
- Verify Pre-Functional Performance Testing
- Conduct Functional Performance Testing



Retro-Commissioning: Hand-Off Phase

PRE-PLANNING

PLANNING

INVESTIGATION

IMPLEMENT

HAND-OFF

- Verify Seasonal Testing of Facility Systems
- Verify O&M Personnel Training
- Conduct “Lessons Learned” Workshop
- Conduct Periodic Performance Evaluations of Systems & Assemblies
- Deliver Final Retro-Commissioning Report (Systems Manual)





What is an Energy Audit / Survey?

- It serves the purpose of identifying where a building or plant facility uses energy and highlights energy conservation opportunities (ECOs). – Albert Thumann
- Detailed examination and analysis of how a facility uses energy.
- Identifies what the facility pays for that energy.
- Recommends a program for changes in operational practices and / or energy consuming equipment.

Energy Audit / Survey Process

- Data Collecting & Analyzing of Facility Operation & Utility Bills
- Interviewing O&M and User Staff
- Reviewing & Assessing Equipment Operation
- Developing Energy Conservation Measures / Opportunities (ECMs / ECOs) & Identifying Cost Benefit
- Creating Action Plan to Implement ECMs/ECOs.
- Various Levels of Audits: ASHRAE has 3

ASHRAE Energy Audits

- Level 1 : Lowest Cost – Preliminary Opportunity Assessment (POA)
 - Walk through site visit
 - Review of Energy Bills (consumption, costs, rate structure)
 - Report includes list of Low cost / No cost Opportunities
- Level 2 : includes Level 1, plus
 - Energy use breakdown by system and energy source
 - O&M practices , Constraints, Economic criteria
 - List of ECMs recommended for further detailed quantification and analysis
- Level 3 : (Investment grade)
 - Detailed site visit, system performance data gathering
 - Level 2 list of ECMs are evaluated in detail. Current costs, potential savings, paybacks
 - High level of confidence in economics and schedule of each ECM

Energy Audit Overall Benefits

- Planning Tool to Develop Future Capital Investment Budget
- Prioritize Which Facilities Need The Most Attention: Finding the ENERGY PIGS!
- Identify the Immediate Impact on Facility O&M Budget
- The FIRST Step in the Retro-Commissioning Process



Audits vs. Retro-Commissioning

Similar but NOT the Same



Audits - Often Performed in “Older” Facilities

- Investigate what's there. Determine how it is performing. Determine if it can be improved economically (Energy & Maintenance Savings offset capital investment – ECMs / ECOs)
- Product is an Implementation Document – Similar to RCx Plan.

RCx – Performed on Existing Buildings, relatively new or old

- Goal – Make facility perform “As Owner Intended”. Owners contractor/ maintenance staff usually performs corrective action.
- Product - Properly operating building, with documentation proving same. Some investment might be necessary.

QUESTIONS?



THANK YOU!