

Commissioning 101

Travis Short, PE, NEBB CP, CxA, BCxP

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About Sys-Tek

- Established in 1995
- NEBB-Certified and ACG-Certified Commissioning Firm
- Provides Technical Commissioning/Retro-Commissioning (Cx/RcX); MEP Engineering; and Testing, Adjusting and Balancing services (TAB)
- Offices in California, Missouri, and Texas
- Industry sectors:
  - Municipal, State, and Federal Government
  - Hospitals and Pharmaceutical Laboratories
  - K-12, Colleges, and Universities
  - Data Center

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- 20 years of experience in Cx, MEP Engineering, and TAB.
- Registered Professional Engineer: Florida, Georgia, Kansas, Louisiana, Missouri, Utah, Washington
- Certifications
  - ASHRAE Building Commissioning Professional (BCxP)
  - AABC Commissioning Group (CxA)
  - NEBB Building System Commissioning (NEBB CP)
  - NEBB Test and Balance of Air and Hydronic Environmental Systems
  - Tridium Niagara AX Provider and Developer

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Webinar Agenda

- What is Commissioning (Cx)
- Cx Standards/Specifications
- Technical vs. Process-Based Cx
- When to Start Cx
- Cx Software
- Questions

What is Cx??

- Process based approach
  - I. Design Phase
  - II. Construction Phase
  - III. Acceptance Phase
  - IV. Integrated System Testing
  - V. Warranty Phase

Commissioning Standards, Specifications, & Guidelines

- ASHRAE Guideline 0 – The Commissioning Process
- ASHRAE Standard 202 – Commissioning Process for Buildings & Systems
- ASHRAE Guideline 1.1 – HVAC&R Technical Requirements for The Commissioning Process
- NEBB Procedural Standard for Whole Building Technical Commissioning of New Construction
- ACG Commissioning Guideline
- 01 91 00 – Total Building Commissioning Specification

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Technical vs. Process Based Commissioning

Technical Cx

- Technical commissioning is based primarily on hands-on inspections and functional testing to verify building systems performance and operation

Process Cx

- Process commissioning manages project quality by observing and reviewing the inspection and testing processes that are followed by the project's designers, engineers, and contractors

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Technical vs Process *Design Phase*

- Both approaches based on ASHRAE Guideline 0
- Technical varies from Guideline 0 in that sampling during the design review is not allowed
- Both approaches encapsulate Owners Project Requirements (OPR) reviews. Technical Cx has the CxA as an active participant in OPR development not just a reviewer

Technical vs Process *Construction Phase*

- Field Inspection
  - **Process** – Creates forms that contractors fill out. Verifies forms have been fully completed by contractors. Sampling is employed for physical verification
  - **Technical** – Creates forms for installation verification. Cx team fills out forms and no sampling is employed

Technical vs Process *Acceptance Phase*

- Functional Performance Testing
  - **Process** – Prepares testing documents that are performed and documented by the installing contractors
  - **Technical** – Not only prepares the testing documents but also executes them with required assistance from the installing contractors

Technical vs Process | *Integrated Testing*

- Only part of Technical Cx

Technical vs Process *Warranty Phase*

- Technical & Process goals are virtually the same
- Similar to LEED's 10-month site visit prescribed in Enhanced Cx.
- Perform required seasonal testing
- Work with facility team to rectify ongoing issues

Case Study #1 Missouri Innovation Campus

- Cx started at the end of Construction on new 138,000 SQFT facility
- Technical Cx uncovered operational issues
- Technical Cx incorporated advanced TAB verification

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Case Study #2
College Multipurpose Building

- Cx started during the design phase of mechanical renovation project
- Technical Cx provided advanced troubleshooting
- Technical Cx ensured controls integration and operation

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When to Start Cx

- **Guidelines, standards, and specifications:** Cx starting when the design begins
  - Some even start prior to design in the pre-design process
- **Reality:** Cx starting at almost any stage of the project
- When should CX start?

Why Use Commissioning Software

- New Building
  - Cx document management and organization
  - On-demand test results and issue management
- Post Cx (Existing-, Retro-, and Re-Cx)
  - Continuous data acquisition for analysis and fault detection

Sys-Tek Cx/TAB Kit Software

CH-7 Performance 7/25/12 @ 3:00PM

Chiller Design Information

Capacity:	600 TONS		
Power:	kW 383.8 kW	kW/Ton 0.640	
Evaporator:	GPM 1440 gal/min	PD 31.8 ft	
Condenser:	1800 gal/min	24.8 ft	

Chiller Performance

Capacity:	407 TONS			
Calculated:	kW 208.7 kW	kW/Ton 0.512	% Load 67.9 %	
Evaporator:	GPM 1063 gal/min	PD 23.5 ft	Delta T 9.2 °F	
Condenser:	1484 gal/min	20.4 ft	9.5 °F	

Cooling Tower Performance

Capacity:	470 TONS
Evaporation Rate:	112.5 %
Evaporative Loss Rate:	1.1 %
Approach Temperature:	11.2 °F
Makeup Water GPM:	14.2 gal/min

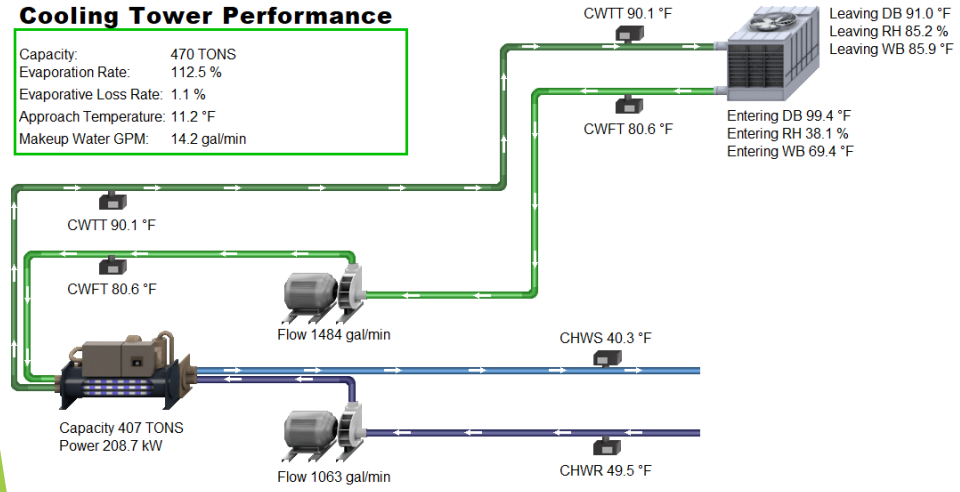


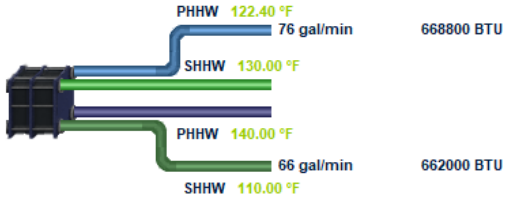
Plate & Frame

Fluid - PHHW

PHHW - lbs/hr:	GPM 76 gal/min	EWT 140.00 °F	LWT 122.40 °F
PHHW - Des BTU:	668800 BTU		
PHHW - Act BTU:	668800 BTU		
PHHW - LMTD:	11.16 °F		
PHHW - HT Coeff:	1137.0 Btu/(ft2 hr F)		

Fluid - SHHW

SHHW - Properties:	GPM 66 gal/min	EWT 110.00 °F	LWT 130.00 °F
SHHW - Des BTU:	660000 BTU		
SHHW - Act BTU:	662000 BTU		



- Virtual Cx Agent
- Ensures repeatability and consistency in the Commissioning process
- Built in engineering analysis for step verification and performance evaluation
- Graphical representation of equipment and data

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Available Information at your Fingertips

- www.sys-tek.com (E-Books)
- www.cacx.org
- www.nebb.org
- www.commissioning.org (ACG)
- www.energymgmt.org

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- Questions?

Western Region Headquarters
2883 East Spring Street, Suite 300
Long Beach, CA 90806
p: 562.426.3355
f: 562.426.6424

Houston, Texas
2800 Post Oak Boulevard, Suite 4100
Houston, TX 77056
p: 713.225.9009
f: 816.224.9377

Kansas City, Missouri
255 NW Blue Parkway Suite 101,
Lee's Summit, MO 64063
p: 816.229.9009
f: 816.224.9377