

# Owner Training from a Commissioning Perspective

8<sup>th</sup> Annual Technical Summit



*Event Sponsored By:*



# 5G

## | AGENDA

- Understanding Benefits of Owner Training
- Common Challenges of Owner Training
- Fundamental Concepts of Owner Training: Development and Application
- Review Lessons Learned: Owner Training on Mission Critical Projects
- Strategies for Successful Owner Training



# 5G

## | PRESENTER BIO

**Presenter: TIM GILBERT, PE, CxA, EMP, LEED AP BD+C**

Mr. Gilbert is the National Cx Director of the Salas O'Brien commissioning team. He holds PE licenses in 14 states and has over 40 years of experience in the mechanical engineering field, including 17 years of commissioning experience. Tim is a Certified Commissioning Authority (CxA) and Certified Energy Management Professional (EMP) through the AABC Associated Commissioning Group (ACG).

Tim is a leading expert in the Commissioning industry including over 20 years of sustainable design, and has been involved in the advancement of the Cx process, guidelines and standards serving as a board member of Building Commissioning Association (BCA), and other various technical committees.

Tim has significant experience with data centers and mission critical facilities, and has been a leader in developing for efficient strategies to enhance the value of the commissioning process for the unique challenges these facilities present.

Tim Gilbert, PE, CxA, EMP, LEED AP BD+C, is the National Director of Commissioning at Salas O'Brien.



# 5G

## | PRESENTER BIO

**Presenter: JAMES D. ANDERTON, CPMP, CxA, LEED GA**

James is an experienced and passionate leader in his field, and has a combined total of 30 years of diversified experience in the Building AEC Industry, in Project Management, Engineering Design, Construction Administration, and Commissioning Services for LEED, Enhanced, & Existing Building Commissioning (EBCx). He is a leading expert in the Commissioning industry and has made significant contributions to the development of Cx process, guidelines and standards. An accomplished presenter, he has been the featured speaker for organizations such as Building Commissioning Association (BCA), California Commissioning Collaborative (CCC), International Facility Managers Association (IFMA), Universal Network Intelligence (UNI), and Green Technologies (GT).

Having worked for National Commissioning providers ranked in the top 100 U.S. based firms, MEP consulting firms also ranked in the top 100, and Mechanical and General Contractors ranked in the top 500 throughout his career, he has dedicated the later part of his career to improving and promoting the quality of commissioning services offered to building owners and facilities operators.

James has applied Design and Construction expertise to Hospitals, Schools, Religious Facilities, Correctional Facilities, Retail and Office Space, Museums, Laboratories, Federal and State Buildings, Spas, Community Centers, and Residential & Commercial Hi-Rise projects. Additionally, he is an experienced journeyman and certified HVAC technician, having provided HVAC, electrical and plumbing system installations earlier in his career.

James D. Anderton, CPMP, CxA, LEED GA, is the Director of Commissioning at Salas O'Brien.

# Understanding Benefits of Owner Training

## Why Train?

- ✓ O&M represents the greatest expense in owning and operating a facility over its life cycle
- ✓ As the technology of building systems becomes ever more complex, the need for documentation and training increases.
- ✓ Inadequate maintenance of energy-using systems is a major cause of energy waste in both the federal government and the private sector.
- ✓ Good maintenance practices can generate substantial energy savings

# Understanding Benefits of Owner Training

## Benefits proper training of building systems will provide:

- Improved comfort and indoor environmental quality Better tenant and occupant satisfaction
- Better protection of critical infrastructure and increased productivity
- Reduced exposure to investor losses
- Reduced O & M costs and increased staff reliability
- Lower utility bills
- Improved net operating income
- Fully trained operating staff insulated from personnel turnover

# Common Challenges of Owner Training

## Eliminating Stop-Gap Measures in Facility Maintenance Programs

### Some common pitfalls to avoid:

- TIMING: Failing to Start Early in Design Phase
- Misapplication of Training: Effort is not “Right Sized”
- Training to the wrong audience
- Failure to identify maintenance staff abilities & limitations
- Incomplete documentation and critical system operating data
- Misunderstanding Critical Operational Requirements (COR):
  - Space Use
  - Schedule
  - Critical System(s)
  - Redundancy requirements during scheduled system maintenance

# Fundamental concepts of Owner Training

## Essential ingredients for successful training: O&M Integration

### PLANNING | ENGAGEMENT | APPLICATION

- Commitment from entire project team starting with the owner
- Establishing Owner's Training Requirements (OTR) to "Right Size" the training effort
- Integration of owner, designer, facilities experience, knowledge & ideas
- Development of the training program
- Effective execution of training and continuous engagement of facilities maintenance



# Fundamental concepts of Owner Training

## Engaging the Owner and “Right Size” The Training Effort

Tip #1: Are we assuming or are we confirming?

### **UNDERSTANDING THE “WHY”**

- *Why are we training the owner’s Staff?*

*For what purpose?*

*What is the greatest need?*

*Have we fully established management’s expectation of O&M?*

*Are we setting realistic expectations of O&M?*

- *Will the level of training proposed achieve O&M Goals?*



# Fundamental concepts of Owner Training

## Engaging the Owner and “Right Size” The Training Effort

Tip #2: Are we asking the “Right” questions?

**BEING REALISTIC MEANS BEING SPECIFIC  
(Start Small and Keep it Simple!!!)**

*What do we expect from our facility and Staff?*

*(Common Factors)*

*Reliability – Security - Comfort - Low Operational Costs - Ease of Churn - Remote Control & Access*

*(Specific Factors)*

*300% Redundancy, \$1.3 Million/Year allocated for O&M, Onsite Staff abilities, contract staff access issues to secure and controlled environments, Emergency maintenance and its impact on operations during 8AM-5PM*



# Fundamental concepts of Owner Training

## Engaging the Owner and “Right Size” The Training Effort

Tip #3: Developing an effective “OTR” (*The Vehicle of Delivery*)

### SETTING EXPECTATIONS & ACCOUNTABILITY



- *What can we afford (Time, Resources, Budget)?*
- One of the goals of creating an Owner’s Training Requirements(OTR) is to identify the contrast between the O&M goals of the **owner** and **facilities management**, to bring to the surface **expectations verse limitations**, resolve them or **come to a compromise** such that a training program can be prepared specific to their organizational goals and staff capabilities.
- Correctly identifying the facility’s critical O&M will improve the effectiveness of the OTR, as well as upper management’s reception, recognition, and continued support for ongoing O&M resources, costs, and efforts.

# Fundamental concepts of Owner Training

## Development & Application

### Types of Maintenance Programs:

Historically the need for maintenance is perceived as a response to an actual or impending failure – ideally, maintenance is performed to keep equipment and systems running efficiently for at least design life of the component(s).

- Reactive Maintenance - *The “Fire Drill”*
- Preventive Maintenance – *Routine Maintenance*
- Predictive Maintenance – *Proactive Maintenance*
- Reliability Centered Maintenance
- Commissioning (Periodic Re-commissioning)

# Fundamental concepts of Owner Training

## Development & Application

### Reliability Centered Maintenance (RCM):

This philosophy utilizes all of the previously discussed predictive/preventive maintenance techniques, in concert with root cause failure analysis. This not only detects and pinpoints precise problems that occur, but ensures that advanced installation and repair techniques are performed, including potential equipment redesign or modification, thus helping to avoid problems or keep them from occurring.

#### Maintenance Priority Matrix for RCM *(Can be Incorporated into the OTR)*

Weighting	Description	Application
1	Emergency	Life, Health, Safety
2	Urgent	Continuous operation of facility at risk
3	Priority	Mission Support / Project Deadlines
4	Routine	Prioritized: First Come/First Served
5	Discretionary	Desired but not essential
6	Deferred	Accomplished only when resources allow

# Fundamental concepts of Owner Training

## Development & Application

### Commissioning as predictive & preventative maintenance – costs and benefits:

Numerous case studies in new and existing buildings have demonstrated resulting O&M-related energy efficiency improvements on the order of 5% to 30% covering a wide range of building uses. The resulting simple payback periods are typically less than 2 years and often less than 0.5 year.

Why Recommission?

*“Operational Drift”*

*“O&M Drift”*



# Fundamental concepts of Owner Training

## Integration Of Owner And Engagement Of Facilities Staff Knowledge & Ideas

**Tip #4: Engagement across disciplines and project phases**

### **1 PART COMMUNICATION : 2 PARTS PARTICIPATION**

- *Good Cx is always finding effective ways to blend the unique Experiences, Perspectives, Conflicts and Interests.*
  - *How can design contribute to the owners O&M goals?*
  - *Engagement of FM with the design team: The unending wish list*
  - *The Training is only as good as the owner says it will be.*
  - *Leveraging Contractor's & Manufactures Experience*

# Fundamental concepts of Owner Training

## Effective Execution Of Training And Continuous Engagement Of Facilities Maintenance

### Tip #5: Continuous Engagement of Facilities Management

#### **DOING IS KNOWING: MORE PARTICIPATION**

- ✓ *Training During Cx Functional Testing*
- ✓ *Periodic Cx site walk-thru with operations staff*
- ✓ *Operations staff review of Cx Draft Functional Test Scripts*
- ✓ *Cx/Operations Staff Testing pre-planning coordination meeting with Contractors*
- ✓ *Operations Staff part of the manpower resources for Functional Testing*
- ✓ *Functional Testing execution and documentation (photos, videos)*
- ✓ *Testing issues and resolutions*
- ✓ *Cx development & coordination with Operations Staff for SOP's/EOP's/MOP's*

# Fundamental concepts of Owner Training

## Training Guidelines and References

- | ASHRAE Guideline 0-2013
- | ASHRAE Standard 202 - 2013
- | BCA – Building Commissioning Best Practices
- | ASHRAE Guideline 4-2008 (RA-2013)
- | Whole Building Design Guide (WBDG)



# Review Lessons Learned: Owner Training

## Universal Lessons Learned

### Minimum Program Development (Key Topics)

Safety Requirements (PPE, Lockout/Tagout)

Routine Scheduled / Preventive Maintenance

General Isolation Procedures

Failure Response (Emergency Shut-down Procedures)

Critical System Troubleshooting and Service

Critical System Diagnosing and Testing

# Review Lessons Learned: Owner Training

## Mission Critical Projects

- Complex control schemes and redundant systems can be challenging from a maintenance perspective.
- Additional training is important to successfully pass on detailed information of the operation of more complex systems.
- This is an area where thorough commissioning is crucial.
- Provide additional design details for any unique requirements for the control sequences.
- Research experiments often need minimal interruption of facility services. It's important that these laboratories operate with minimal interruption from outages or preventive maintenance operations. Laboratory building support equipment needs to be in accessible locations that are non-invasive to the ongoing science operations.

# Strategies for Successful Owner Training

## Facility Management Resources

**Determine the right approach to facility management practices:**

- Computerized Maintenance Management System (CMMS)
- O&M Contracting
- Onsite Staffing
- Combination of O&M Contracting and Onsite Staffing



# Strategies for Successful Owner Training

## O&M: BEST PRACTICES

### Training provided to facilities maintenance staff (FMS)

- Hands-on and Classroom Training
- Understanding & conveying maintenance impacts to the owner
- Developing meaningful operational troubleshooting and system maintenance procedures
- Teaming with the engineer of record, contractor & manufacturer to yield better results during Training Sessions

# Strategies for Successful Owner Training

## Ensuring Useful Training Documentation

### System Specific Content: (*Systems Manuals*)

- General Purpose of System
- Use of O&M Manuals, Control Dwg's, Schematics
- Modes, seasonal changeover, manual operation
- Interactions with other systems
- Adjustments & Optimizing methods for Energy
- Special Maintenance Replacement Sources

# Strategies for Successful Owner Training

## O&M: BEST PRACTICES

### Developing System Specific Maintenance Tasks

#### WATER COOLED CHILLER

- Check setpoints
- Check for fouling of evaporator and condenser tubes
- Check water quality
- Check for leaks
- Conduct oil analysis and change as necessary
- Check strainers and valves
- Check electrical connections

# Strategies for Successful Owner Training

## O&M: BEST PRACTICES

### Developing System Specific Maintenance Tasks

#### COOLING TOWER

- Setup a testing program/schedule for water quality
- Setup strict schedule of water treatment and blow down to prevent buildup of mineral deposits and premature corrosion
- Setup a schedule for periodic cleaning
- Check condition of fill, wood frame, nozzles, water level control and degree of approach.
- Check for leaks

# Strategies for Successful Owner Training

## O&M: BEST PRACTICES

### Developing System Specific Maintenance Tasks

#### HVAC WATER PUMPS

- Check for Vibration
- Check Bearing temperature
- Check for unusual noise
- Check for entrapped air at impeller (Cavitation effects)
- Check flow @ design RPM and FLA
- Check for leaks

# Strategies for Successful Owner Training

## O&M: BEST PRACTICES

### A TRAINING PLAN THAT ADDRESSES TRANSITIONING FROM CONSTRUCTION TO OCCUPANCY

- Schedule should include enough time for FM to run thru sequences of operation before the facility “Goes Live”
- Videotaping Training and “Professional Editing” necessary for post construction or changeover of FM staff. *Video quality is not as important as editing content.*
- Change of Staff Procedures (New FM’s)
- Deferred or Seasonal Testing to revisit Training
- Extending the CxA’s scope to remain on site to work with the FM staff as they transition from construction to occupancy.

# 5G

## | CONCLUSION

## Thank You

**Tim Gilbert, PE, CxA, LEED AP**  
National Director of Commissioning  
SALAS O'BRIEN  
[tim.gilbert@salasobrien.com](mailto:tim.gilbert@salasobrien.com)  
[www.salasobrien.com](http://www.salasobrien.com)

**James Anderton, CPMP,  
CxA, LEED GA**  
Director of Commissioning  
SALAS O'BRIEN  
[james.anderton@salasobrien.com](mailto:james.anderton@salasobrien.com)  
[www.salasobrien.com](http://www.salasobrien.com)

