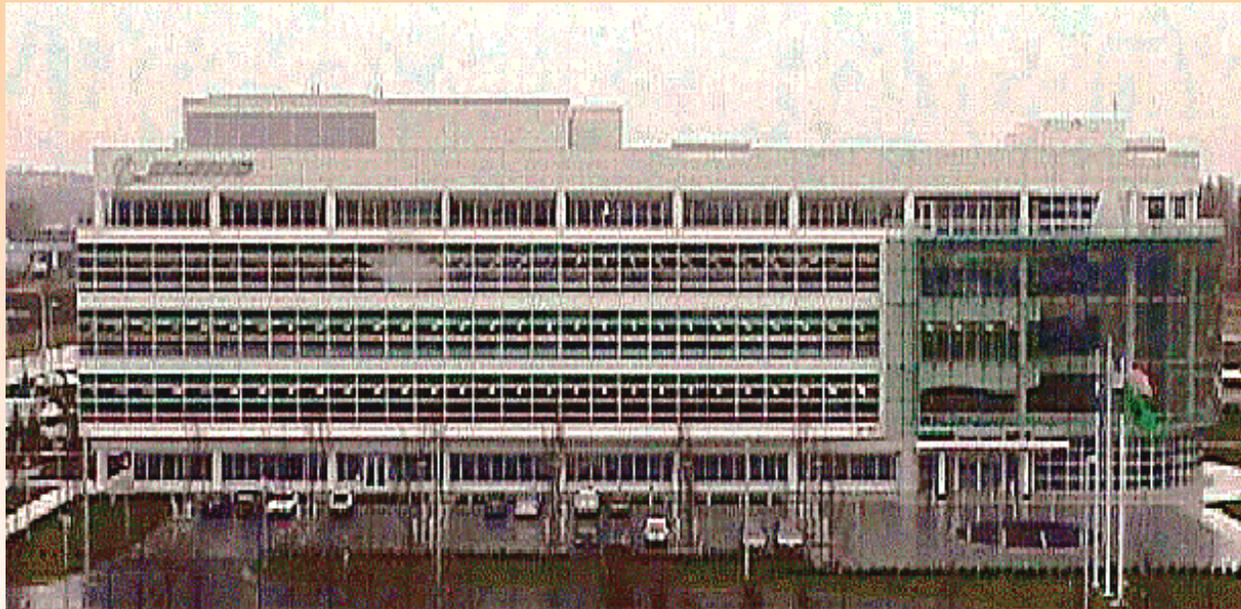


Commissioning the BCAG HOB



Boeing Commercial Airplane Group
Headquarters Office Building
Longacres Park Renton, WA

Engineering Economics, Inc



Commissioning Team

- **Boeing Facilities Staff**
PM, User Groups, Ops & Maintenance
- **Engineering Economics, Inc.**
Commissioning Agent
- **Baugh Construction**
General Contractor
- **MacDonald - Miller**
Mechanical Contractor
- **Cochran Electric**
Electrical Contractor
- **The Bowlin Co.**
Controls Contractor

Commissioning Benefits

- Enhanced project communication and subtask scheduling
- Forum for problem resolution
- Continuity between design intent, plans and specs, installation and operation
- Documented installation, start-up & control of equipment and peripherals

Commissioning Benefits (cont'd)

- Quality assurance processes
- Functional testing and documentation of integrated systems performance
- Improved hand-off to facilities personnel
- Integration with in-house maintenance and asset tracking programs

Value of a 3rd Party Cx Agent

- Dedicated focus on Cx process to augment client and contractor staff
- Owner's Representative throughout project
- Provide continuity between client, design, vendor and construction personnel
- Develop and administer functional tests
- Identify and organize documentation requirements

Contractor Cx Tasks

- Mechanical
 - Specified testing documentation
 - Start-up and controls duties
 - Functional testing participation
 - Controls subcontract
- Electrical
 - Specified testing documentation
 - Interbuilding communications
 - Fire alarm subcontract

Contractor Cx Tasks

- General
 - Construction task coordination w/ Cx tasks
 - Finalized documentation to CA
- Controls
 - Final control sequences w/ client staff
 - System as-building and tune-up
 - Participation in functional testing

Contractor Cx Tasks

- Commissioning Agent
 - Write Cx Plan
 - Conduct weekly meetings
 - Construction process facilitation
 - Cx Site Observation reports
 - Write and administer functional performance tests during and after construction
 - Compile Cx Manual

CBM - Condition Based Maintenance

- **What does CBM Team do?**
 - Assess the existing condition of machinery by collecting, analyzing, and trending key parameter data with advanced technology equipment.
- **Baseline**
 - The first set of data collected
 - Compared to known standards

CBM - Discoveries & Solutions

- 40 Hp Air Handler Return Fan Motor
 - Leads shorted to ground, repaired motor
- 1 Hp Fan Coil Unit Motor
 - 20% resistive imbalance, replaced motor
- 7 1/2 Hp Motor Cooling Fan
 - Loose fan - tightened w/no damage
- 40 Hp Supply Fan, 5 Belt Drive
 - Belt resonance - avoid known speeds

CBM Functional Testing Tasks

- Power profiles of large motors w/ VFD's
- Run up / coast down test for resonance checks
- Control signal calibration (% speed)
- Harmonics profiles

Future Suggestions

- Increased Cx focus during design phase
 - Full integration of customer design criteria w/ construction specs
 - Design review with controls and operations perspective
 - Detailed testing requirements in contract documents

Cx Services Provider



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