Commissioning
Team Building
Networking with NEBB firms
Team Introductions

- Curtis Anthony – Optimum Energy Solutions
- Steve Wiggins – Newcomb & Boyd
- Jeff Houpt – Automation Integrated
Why Network with other firms?

- Enhance technical capabilities
- Increase reputation by providing customers with an expanded work product.
- Avoid unnecessary certification and equipment cost for low volume market.
- Promote NEBB Specialized programs.
- Develop experience and skills in new NEBB programs for future interest.
- Grow manpower
NEBB Specialized Certification

- HVAC Commissioning
- Electrical Commissioning
- Fume hood ASHRAE 110 Certification
- Clean room Certification
- Envelope Certification
How to select firms for networking

- Review firms experience and certifications
- Obtain resumes and references
- Set up meetings
- Select non competing firms, or firms specialized in the NEBB program your soliciting.
- From networking at NEBB meetings
Team Management

- Establish Project and team communication
- Develop a Base of operations
- Aid in travel and transportation
- Integrate all programs into a master plan
- Develop test plans and schedules
- Follow up with issue log items
- Aid in scheduling of special test, if necessary, fill in for last minute activities.
- Verify systems ready for testing before team travel.
Communication with Owner and project team

- Schedule initial site visit and meeting with owner. If possible Introduce firm prior to kick off meeting.
- Introduce firm at kick off meeting establish partnership.
- Communication protocol should be established through the host firm. (issues, change orders, communication with all vendors that are apart of the testing.)
Project preparation

- Develop and integrate special programs into master project plan
- Develop similar form formats (XLS, word, Building test, etc.)
- Integrate commissioning for each program into a master schedule.
- Establish schedules including site visits, limit partnering firm travel expenses by performing pre-functional activities, maintain team awareness, beware of issues and notify firm to clarify and aid resolving issues.
- Identify HVAC-Electrical integrated test
Project Overview
Building layout
## Schedule of Integrated Testing

<table>
<thead>
<tr>
<th>Task</th>
<th>Assigned To</th>
<th>Start</th>
<th>End</th>
<th>Dur</th>
<th>%</th>
<th>2/5</th>
<th>2/12</th>
<th>2/19</th>
<th>2/26</th>
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<tbody>
<tr>
<td>Project</td>
<td></td>
<td>2/10/12</td>
<td>2/16/12</td>
<td>5</td>
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<tr>
<td>1 HVAC-White Space load testing (CRAC units)</td>
<td>HVAC</td>
<td>2/10/12</td>
<td>2/10/12</td>
<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2 HVAC-White Space Load testing (economizer &quot;on/off&quot;)</td>
<td>HVAC</td>
<td>2/10/12</td>
<td>2/12/12</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>3 UPS rooms load testing (CRAC units)</td>
<td>HVAC</td>
<td>2/13/12</td>
<td>2/16/12</td>
<td>4</td>
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<tr>
<td>4 Electrical-Full Load UPS Burn-In</td>
<td>Electrical</td>
<td>2/14/12</td>
<td>2/15/12</td>
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<tr>
<td>5 Electrical-Generator Full Load</td>
<td>Electrical</td>
<td>2/10/12</td>
<td>2/10/12</td>
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<tr>
<td>6 Electrical-Battery Run Down</td>
<td>Electrical</td>
<td>2/13/12</td>
<td>2/13/12</td>
<td>1</td>
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<tr>
<td>7 Electrical-UPS Load Test 0-50-100%</td>
<td>Electrical</td>
<td>2/13/12</td>
<td>2/14/12</td>
<td>2</td>
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<tr>
<td>8 HVAC-Emergency Chiller recovery test</td>
<td>HVAC</td>
<td>2/10/12</td>
<td>2/14/12</td>
<td>3</td>
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<td></td>
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</tbody>
</table>
Preparing for Integrated load test

- Initiate heaters for white space
- Identify hot spots
- Relocate diffusers for equal temperature distributions through racks.
- Relocate sensors for optimum CRAC operations
- Identify electrical components heat loads
White Space Load Test
(Rack Mounted Heaters)
White Space RPP Locations
White Space Racks
White Space Logger set up
CRAC Sensor locations above
Computer Room Units Configuration

**White Space (7 Units)**
- Individual capacity-26 Tons
- 17300 CFM
- Under floor secondary Chilled water loop
- Three variable speed fans
- Electric Reheat with Humidification capabilities
- Total available capacity 182 Tons

**UPS Rooms A,B (2/RM)**
- Individual capacity-18 Tons
- 12500 CFM
- Cooling-secondary Chilled water loop
- Two variable speed fans
- Total UPS Room Capacity-36 Tons
White Space trending server

![Graph showing server loads over time with lines for Server Lvl BB, Server Lvl X, and Hot Aisle.](image-url)
Emergency Chiller Recovery

ID 4: Server 44,47 CH-1 Switch over Supply air (floor Level)

- Chiller initiation
- Restore to plant

45 min recovery
20 min recovery

Graph showing temperature changes over time:
- Temp, °F
- Temp, °F

Time stamps from 4:45:18 PM to 6:53:08 PM.
BAS & CFMS Outputs (Emergency Chiller)
Alarm And Point Verifications
Critical Facilities Monitoring System

CFMS Key Features

• Complete user requirement documentation through CX process.
• Completed in 8 weeks from design to CX.
• Over 20,000 integrated points
• About 24 hard-wired.
• Incident Management (Online SOP Integration).
• 4G Wireless alarm backup
## Protocol Level Integration

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Integration</th>
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</thead>
<tbody>
<tr>
<td>SNMP (MIB)</td>
<td>MS Active Directory</td>
</tr>
<tr>
<td>SMTP</td>
<td>Modbus RTU</td>
</tr>
<tr>
<td>XML</td>
<td>LonWorks</td>
</tr>
<tr>
<td>oBIX</td>
<td>Modbus TCP/IP</td>
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Critical Facilities Monitoring System

**CFMS**

- Protocol level integration *Device Drivers* reduces software ‘silo-ing’.
- Automated integration process allowed automatic log and alarm config. for functional diagnostics/analytics.
- Continuous CX through analytics applied through BAS HayStack naming standards.
- Retro-CX capabilities through ‘rules database’.

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Image 1: Schematic diagram showing connections between various components.

Image 2: A Veeder Root display with various statuses and notifications.
UPS Room Load testing
UPS TESTING FLUCTUATING VOLTAGE (Dirty Power)
UPS Under Voltage Modulation
Battery Banks
UPS Burn in & Battery Run down test.
CRAC 10 UPS-B
UPS Load during Battery burn in.
Battery run down
NEBB Team Building Results