Dallas/Fort Worth International Airport
Continuous Commissioning®

International Conference for Enhanced Building Operations
New York Marriott at the Brooklyn Bridge
New York, NY

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DFW Airport Overview

- Serves Dallas & Fort Worth
- 18,076 acres (29.8 square mi.)
- 7 runways - 4 are 13,400’
  - 4 aircraft can land simultaneously
- 3 control towers
- 5 terminals - 174 gates
- 685,000 operations annually
- 60 million passengers annually
- $26.5 MM energy budget
  - ~200 electric accounts
  - 20 natural gas accounts
Continuous Commissioning® - Consolidated Rent-A-Car Center

- Opened in 2000, First CC in 2004 and a follow up in 2010
- Excessive outside air
- Duct static pressure too high
- Economizer cycle was not optimized
- Space temperatures varied from 65°F to 80°F (18°C to 26.7°C)
- Excessive reheat even in summer time
- Both 280 ton chillers were required to meet peak load (one was designed as a backup)
Continuous Commissioning® - Consolidated Rent-A-Car Center

Results of CC Project

Rent-A-Car Center Electric Consumption

$767,000 in Total Savings

19% reduction in monthly average
Continuous Commissioning® - Administration Building

- AHU’s running 24/7 although building is largely a weekday operation
- Most AHU’s were being operated manually instead of by the BAS
- Supply air temperatures were generally set at a constant 56°F (13°C)
- Economizer cycle was not optimize
- No separation between heating and cooling set points
- Excessive reheat even in summer time
- Simultaneous heating and cooling
Continuous Commissioning® - Administration Building

![Graph showing energy consumption changes in Administration Building from 2003 to 2011. The graph indicates a $340,000 energy cost reduction post-Continuous Commissioning (CC).]
Continuous Commissioning® - Terminal D (International Terminal)

- Need to implement occupancy schedule for AHU’s
- Reduce outside air during low occupancy period
- Standardize heating and cooling setpoints to eliminate simultaneous heating and cooling
- Convert some large constant volume AHU’s to VAV operation by reprogramming controls sequence
- Optimize supply air temp., duct static pressure, and return fan speed
Continuous Commissioning® - Terminal D (International Terminal)

Results of CC Project – $4,690,000 in energy savings (direct electricity, hot and chilled water)
Continuous Commissioning® - Energy Plaza (CUP)

- Originally opened in 1973, Upgraded in 2005
- 42,000 tons of cooling capacity
  - Provides cooling services to 6.6 million sq.ft. of conditioned space
  - 9,000 tons of Pre-conditioned Air (PCA) for docked Aircraft
- 6 million gallon thermal storage tank
  - Shifts 15 MW of on-peak demand
- 215,000 lbs/hr steam boiler capacity
- 79 million kWh of electricity annually
- 360,000 MMBtu of natural gas annually
- $7MM annual energy budget
Continuous Commissioning® - Energy Plaza (CUP)

CC® Assessment/Implementation

- Optimize steam pressure
- Optimize TES operation
- Optimize cooling tower fan control strategy
- Implement a chiller cooling water temperature reset schedule
- Optimize PCA operation (minimize switching from heating to cooling)
Continuous Commissioning® - Energy Plaza (CUP)

Results of CC Project – $3,300,000 saved (direct gas and electricity)
## Continuous Commissioning® Projects

<table>
<thead>
<tr>
<th>Site</th>
<th>Size (sq. ft)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent-A-Car Center</td>
<td>130,000</td>
<td>2004, 2010</td>
</tr>
<tr>
<td>Administration Building</td>
<td>81,000</td>
<td>2007</td>
</tr>
<tr>
<td>Terminal D</td>
<td>2,000,000</td>
<td>2008-2009</td>
</tr>
<tr>
<td>Energy Plaza (CUP)</td>
<td>41,000 tons of capacity</td>
<td>2008-2009</td>
</tr>
<tr>
<td>Terminal E</td>
<td>460,000</td>
<td>2010</td>
</tr>
<tr>
<td>North Business Center</td>
<td>52,000</td>
<td>2010</td>
</tr>
<tr>
<td>Energy Plaza (HVAC)</td>
<td>125,000</td>
<td>2010</td>
</tr>
<tr>
<td>Skylink MSF</td>
<td>106,000</td>
<td>2011</td>
</tr>
<tr>
<td>Procurement Warehouse</td>
<td>61,000</td>
<td>2011</td>
</tr>
<tr>
<td>Human Resources</td>
<td>14,000</td>
<td>2011</td>
</tr>
<tr>
<td>Asset Management complex</td>
<td>98,000 (5 buildings)</td>
<td>2011</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,257,000 sq ft</strong></td>
<td></td>
</tr>
<tr>
<td>4 Fire Stations, AOC, DataCenter, EAD, etc.</td>
<td>130,000 sq ft</td>
<td>2012</td>
</tr>
</tbody>
</table>
Continuous Commissioning® - Summary

Cumulative Energy Savings for All DFW Projects

DFW International Airport
Cumulative Savings

- Others
- Terminal E Electricity
- Terminal E CHW
- Terminal E HW
- North Business Center Electricity
- North Business Center CHW
- North Business Center HW
- EP Electricity
- EP Natural Gas
- Terminal D Electricity
- Terminal D CHW
- Terminal D HW
- Admin Electricity
- Admin CHW
- Admin Natural Gas
- RCC Electricity

Cumulative Energy Savings:
- Apr-07: $0
- Aug-07: $0
- Dec-07: $0
- Apr-08: $0
- Aug-08: $0
- Dec-08: $0
- Apr-09: $0
- Aug-09: $0
- Dec-09: $0
- Apr-10: $0
- Aug-10: $0
- Dec-10: $0
- Apr-11: $9,599,653
- Aug-11: $9,599,653
- Dec-11: $9,599,653
DFW International Airport
Dallas/Fort Worth Texas

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