“Emerging Growth Markets”

SMACNA
2010 Partners in Progress Conference
Presented By

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McQuay International
*a member of the Daikin Group*
“Emerging Growth Markets”
Energy
Energy
Higher Energy......
Costs *Are* the Future
Technology
People
Energy Technology People
Energy

• There are over 5 million commercial and industrial building in the U.S.
• The combined energy costs for those building is over $200 Billion each year
• 30% of the energy used in those building is used inefficiently
• U.S. Commercial buildings emit 17% of the U.S. greenhouse gases, Industrial facilities emit 28%
Energy
“Solve customers problems in the most economical way”
Energy
Energy

• New Buildings projects
• Renovation Building projects
• New approach to meet new needs
Technology
Technology – No Oil
Technology – No Oil

The High Cost of Oil Contamination

<table>
<thead>
<tr>
<th>Oil In Evaporator</th>
<th>Performance Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2%</td>
<td>2-4%</td>
</tr>
<tr>
<td>3-4%</td>
<td>5-8%</td>
</tr>
<tr>
<td>5-6%</td>
<td>9-11%</td>
</tr>
<tr>
<td>7-8%</td>
<td>13-15%</td>
</tr>
</tbody>
</table>

## Technology – No Oil

<table>
<thead>
<tr>
<th>Capacity (tons)</th>
<th>Full load, kW/ton</th>
<th>IPLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>0.531</td>
<td>0.312</td>
</tr>
</tbody>
</table>

Rebates

- Don’t forget rebates!
- Figure out the Rebate red tape
- Be the Rebate expert
Transport Cost

• Significant improvement in individual components is getting more difficult
  o Approaching Isentropic efficiency
• Focus must shift to the entire system
  o Integrated design considering all operating conditions
  o Reduction in Transport costs
• Bleeding edge will focus on integration and parasitic (transportation) losses
Transport Cost

42” Duct 2” Pipe 5/8” Refrigerant Pipe

All move the same amount of Energy
Transport Cost

Variable Refrigerant Volume
Technology
Building Information Models (BIM)
BIM: What It Is and Why It’s Important

• BIM is the next step in building design software
• BIM is essentially a 3D CAD system whereby components relate to each other and communicate with each other

Manual ⟷ CAD ⟷ BIM

- Think in 3D
- Draw in 2D
- Change faster
- Print to a plotter
- Exchange files

- Think in 3D
- Design in 3D, render 2D or 3D
- Simulate
- Involve all players in process
BIM: What It Is and Why It’s Important

BIM is a database, not drawings

• Made of intelligent objects rather than lines, arcs and text
• Objects have data and attributes about their geometry and non-graphical properties— the “I” in BIM
BIM: What It Is and Why It’s Important

BIM is a group of interoperable databases

- Discipline-specific models that can interoperate with each other
  - Architectural model
  - Structural model
  - HVAC model
  - Piping model
  - Telecommunications model
  - Electrical model
  - Furniture model
  - Civil model
  - Construction model
  - Fabrication model
  - Facility management model

Image Source: Bentley Systems
BIM: What It Is and Why It’s Important
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Images: Bentley

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BIM: What It Is and Why It’s Important

BIM is an interoperable database

Images: Burt Hill, University Mechanical, Ryan Homes, View By View, Beck Group, IES, SOM
BIM is an interoperable database
BIM: What It Is and Why It’s Important

BIM is an interoperable database

Tools for analysis, simulation, specialty design
Energy Analysis

Export performance characteristics of objects to analysis tool

- Thermal properties
- Light transmittance
- Surface reflectivity

Source: Burt Hill
Daylight Assessment

Luminance Levels at LEED EQ Credit 8.1

Studied Typical Room
Energy Analysis

LEED NC 2.2 credit 8.1

Daylight simulation model data:

- Project file: c:\mytemp~1\spring~1\ies\spring~1\Springfield 4_11 mit
- Calculated at Friday, April 13, 2007, 8:40 AM
- Sky model: CIE Clear Sky on 21 Mar at 12:00
- Location: Philadelphia, Pennsylvania (39.87N, 75.25W)
- Working plane height: 30 inches
- Grid size: 2 feet
- Illuminance threshold = 25.000 fc

Eligible rooms for daylighting

<table>
<thead>
<tr>
<th>Room ID</th>
<th>Room name</th>
<th>Floor area (ft²)</th>
<th>Minimum illumination (fc)</th>
<th>Working plane area &gt; threshold (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0003A2BC</td>
<td>6 CLASSROOM</td>
<td>669.209</td>
<td>1.229</td>
<td>252.899</td>
</tr>
</tbody>
</table>

| Total area (ft²) | 669.209 |
| Total area above threshold (ft²) | 252.899 |
| Percentage       | 37.8%   |

LEED NC 2.2 EQ credit 8.1 daylight and views: **FAIL**

A pass requires 75% or more of the total area to be over the threshold.

Source: Burt Hill
Energy Analysis

Worked with design team to modify:

- Glazing area and placement
- Surface reflectivity
- Lightshelves
- External shading

Source: Burt Hill
Energy Analysis

75% of 3' work plane above 25 fc threshold

Ft_C
95
85
75
65
55
45
35
25
15
5

New Design Passed

Source: Burt Hill
BIM: What It Is and Why It’s Important

BIM content (intelligent product objects) is critical to BIM value.

Analysis Tools
- Schedule
- Energy simulation
- Cost
- Coordination
- Fabrication
- Visualization

Simulation and Analysis

Intelligent Objects serve the requested properties to the Analysis Tools

Images: Turner, Burt Hill, Beck Technologies, University Mechanical, View-by-View
BIM: What It Is and Why It’s Important

• Highlights of the Findings:
  • Almost 50% of the industry is now using BIM.
  • All BIM users plan significant increases in their use.
  • Two-thirds of BIM users say they see positive ROI on their overall investment in BIM.
  • Skill level directly relates to experience of value.
  • 40% of non-users plan to adopt within 2 years.
BIM: What It Is and Why It’s Important

• Owners are Mandating BIM:
  o Federal:
    • GSA, VA, US Army Corps of Engineering, State Department
  o State:
    • Wisconsin, Texas
  o Private:
    • Health care, Retail

McGraw Hill
SmartMarket Report: The Business Value of BIM
Getting Building Information Modeling to the Bottom Line
BIM: What It Is and Why It’s Important
BIM: What it is and Why it’s Important

• Find your place in the BIM process
• Work different – Collaborate – Partner
• Be prepared to build subassemblies in shop conditions

• BIM is here to stay – Be part of it
Saving Energy and the Team Concept

How you design Vs. How you operate

Did you get what you paid for?
Saving Energy and the Team Concept

ASHRAE
Building EQ

Source: ASHRAE Journal
People – Your Workforce

Source: ACHR NEWS
People – Your Workforce

• Retaining and Recruiting
• Support your schools
• Use products that are easier to install and repair
• Use technology to reduce field labor
People - Healthcare

Wellness, Sickness and Aging - A Growing Opportunity
People - Healthcare

- 66% of hospitals say they will grow
- 50% will add bricks and mortar
- $12 – $14 Billion dollar business – could be $30 Billion by 2020
- 70% are planning renovation
- Annual energy bill is over $5 Billion

- Save Healthcare energy – a Real opportunity
Energy Technology People
Thank You