Sustainable Planning for IIT Buildings

Summer 2006
IPRO 320
Project Goals

- Review building systems
- Quick snapshot of the condition of the buildings
- Reduced maintenance costs
- Review of building thermal comfort
Work Distribution

- Field Data Collection Team
- Device Model Building Team
- Research and Data Analysis Team
Our Commissioning Process

- Field inspections
- Review available existing drawings and data
- Site survey group
- Existing physical Plant condition study

- Project Goals
- Review Building Systems
- Review Building Equipment
- Review Building Operations

- Design Criteria
  - Evaluate possible Energy conservation Measure(s)
  - Review program Again
  - Evaluate operations And maintenance procedures

- Energy conservation study
- Initial commissioning Plan
  - Schematic phase Documents

- Design criteria
  - Systems description
  - Documentation requirement
  - Verification procedures
  - Commissioning documentation
  - Operations & maintenance
Field Data Collection Team
Data Collection Overview

- Researched finding a Data Collection Device

- Determined areas to be measured

- Using floor plans of buildings and a device we measured temperature and humidity in certain locations throughout the buildings

- Spoke with various occupants of the buildings to get an overview of inconsistent areas throughout them

- Recorded data collected as well as observations for further analysis
Device Model Building Team
**GOALS**

- Create an **AFFORDABLE** air capture hood
  In order to
- Measure air flow through **DIFFUSERS**
  While
- Maintain **ACCURACY**
  In order to
- **IDENTIFY** ducts that require maintenance.

**WHY**

- A part of commissioning involves **AIR BALANCING**. This involves checking the flow through diffusers to make sure spaces are receiving adequate conditioned air
- This affects the **COMFORT** of the occupants
Preliminary Testing for Prototype 2

Prototype 2 was tested on an a supply and return diffuser, and compared with professionally taken measurements.

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<th>Supply</th>
<th>Proto2</th>
<th>Professional</th>
<th>Error</th>
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<tbody>
<tr>
<td>340 CFM</td>
<td>380 CFM</td>
<td>10.5%</td>
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<tr>
<td>65 CFM</td>
<td>100 CFM</td>
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This prototype is fairly accurate at higher air flows, but less accurate at low flows. It would probably be possible to formulate a correction factor in proportion to air flow to achieve accurate measurements using a low cost, self-made hood.

- Can be fairly accurate
- Extremely AFFORDABLE at $40
- Although TIME CONSUMING
- More appropriate for an IN DEPTH PROJECT
Research and Data Analysis Team
Data Analysis

- Temperature and Relative Humidity plotted on a Wet-Bulb Temperature vs. Dry-Bulb Temperature Graph

- Points are analyzed according to their position in relative to comfort zone

- Provide Performance snapshot of the buildings
Comfort Chart

Comfort Chart Summary

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<th>100%</th>
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Dry-bulb temperature (F)

50 60 70 80 90 100

Wet-bulb temperature (F)

MTCC Life Sciences Stuart Crown Hall Perlstein Alumni Memorial Hall HUB Siegel Hall Main
Reference


- ASHRAE Handbook


Credit

- Prof. Nancy Hamill, Illinois Institute of Technology
- Russel Smith, Siemens Inc.
- Bill Fridono, AEROTECH Balance Inc.
Question Time