Practical Lessons Learned from Implementing Intelligent Lighting Systems

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OOOO! A SHINY NEW TOY!

HELL YEAH!
What We’re All Talking About

- Any Lighting Discussion = LED
- Focus does not equal adoption
What We’re All Talking About

Watt’s Next for Energy Savings in Lighting

If all U.S. lighting installations were replaced overnight with the best LED technologies available in 2014, our nation would save 4,896 trillion Btu of energy. That is MOST of the 7,000 trillion Btu we now use for lighting. Far and away, two categories of products—linear and low/high bay—have the greatest overnight potential.
What We’re All Talking About

• Any Lighting Discussion = LED
• Focus does not equal adoption
• LEDs only represent 3% market penetration
• Overnight switch = $49 Billion savings
• Better Integration of lighting controls
Today’s Presentation
Today’s Presentation
The Future

35 Billion Devices by 2020
Source: Gartner
The Key To Future Buildings
The Key to Future Buildings
LED Lighting

- LED Lighting is simple

\[ 100 - 50 = 50 \]

- Controls are different.

\[
\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)! (1103 + 26390k)}{(k!)^4 396^{4k}}
\]
• No Controls = Money Left on the Table
Implementing Intelligent LED Lighting Systems
• Existing Profile
  – 2 Year Old Building
  – 300,000 sqft running 24/5
  – 4L T8 Lighting
  – Relay system tied to BMS. Lights on/off based on schedule
  – Heat = Lighting?
  – Relay failures – banks of light going out
• Evaluation Process
  – Building 100% manufacturing.
  – Questioned individual fixture control – believed 100% building occupancy.
  – Automation
  – Concern over ‘blinking’
  – Installed trial set of fixtures
  – Actual Occupancy = 30%
Manufacturing

• Solution
  – 12,000 Lumen LED w OC & DH sensor
  – Wireless mesh network
  – Operating Profile:
    • 80% full brightness.
    • No occupancy 1 minute = reduce to 30%
    • ‘Gradual’ Dim

• Savings
  • 345,748 Annual kWh
  • 225,680 – fixtures
  • **120,068 from controls**
• Lessons Learned
  – Assumptions are not data
  – Worker complaints
  – Value of cultural elements
  – Involving IT early
• Existing Profile
  – General office space running 100 hrs/wk
  – Hallways running 24/7
  – 3 Lamp Parabolic (88W)
  – Most offices/hallways around bldg perimeter with large windows
  – Abandoned Lighting Control System
  – Maintenance: 1 Lamp = 3 Lamps
  – Several unoccupied spaces (cubes/offices) with lights on.
Office Space

• Solution
  – 39W LED Retrofit Troffer
  – Sensors in each fixture – OC/DH
  – Operating Profile:
    • High Level – 88%.
    • No occupancy 1 min = dim to 20%
    • Fixtures ‘grouped’
  – Savings
    • 218,551 kWh
    • 134,947 from fixture
    • 82,017 from controls
Office Space

• Lessons Learned
  – Upfront work streamlines commissioning
  – Choice = challenge
  – Communication
  – Retrofit value in offices
• Existing Profile
  – 5 Year Old Building, Lights 24/7
  – Building not occupied 24/7 but pickups at off hours
  – 6L T5 Fluorescent existing lighting
  – Fixtures showing end of life issues
  – Motion sensor each aisle – 30 minute timeouts.
• Issue in cold areas – fixtures not coming on
Warehousing/Distribution

• Solution
  – Combination of LED luminaires – 13/18/26K
  – Sensors in each fixture – OC/DH
  – 1 for 2 replacement
  – Operating Profile 1:
    • Every other fixture on @ 10% unoccupied.
    • 80% high on occupancy
  – Operating Profile 2:
    • Fixtures turn off if no occupancy for 30 seconds
    • Ramp to 80% on occupancy
  – “Follow me” technology in aisles
Warehousing/Distribution

• Solution
  – 1,416,918 Annual kWh savings
  – 935,007 from fixtures
  – 481,914 from controls

• Lessons Learned
  – High Mounting Height Considerations
  – Important of quality of delivered light
  – Value beyond energy
  – Gateway location challenges
What to Know

• Choosing an intelligent controls platform
  – What is your application?
  – User Friendly software?
  – Scalability
  – Company performance & stability
What to Know

• Validate Energy Savings
• Getting Stakeholders Involved
• Human Factor
• Commitment
• Utility Company Changes
• Every company is a tech company
Questions?

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