LIGHTING LAYOUT GUIDE SERIES

CONTROLS GUIDE 2

ADVANCED LIGHTING CONTROLS SYSTEM

THE OPPORTUNITY

When multiple control strategies are used together, benefits for energy savings and user productivity can be maximized. Many energy codes require controls to be used in a variety of spaces, but often the controls are from different suppliers and sometimes installed by different contractors. This makes coordination and interoperability a challenge.

Often missing from a lighting project is the post-occupancy follow-up to determine the performance of the system. This can be particularly difficult when evaluating effectiveness of a lighting control system. One of the big advantages of an Advanced Lighting Controls System (ALCS) is that results can be reported and the system adjusted after installation.

THE SOLUTION

When using an ALCS, the system is networked and highly flexible. It can gather data and report on power use, occupancy patterns, system performance, and operating status for specific fixtures, groups of fixtures (zones), or whole floors with ease. This allows the lighting to be evaluated and adjusted as needed. The network capability enables zones or individual fixtures to adapt to changing conditions in the space.

BENEFITS	ATTRIBUTES
Flexibility	System components have unique digital addresses that can be easily rezoned.
Customization	With wireless systems, new features can be added and reconfigured as needs change.
Reporting	Activity and component performance can be measured and evaluated against expectations.
Graphical User Interface (GUI)	Makes system programming and commissioning more intuitive.
Auto Demand Response	System can receive signals from the local utility to scale back load when stresses to electrical grid are present.

KEY TIPS

Education for users, operators, owners and installers about the system is critical to ensure optimal performance, acceptance and persistence of the ALCS.

Many components of an ALCS can be incorporated directly into the luminaires at the factory.

If task lighting and the ambient lighting are controlled separately, there is a potential for deeper savings and higher user acceptance.

LED source luminaires offer a higher degree of control, and therefore provide more energy savings potential than fluorescent and HID lighting.

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ADVANCED LIGHTING CONTROLS - BASIC COMPONENTS

TYPE	DESCRIPTION	BENEFITS	LIMITATIONS	TECH NOTES
Controllable Luminaire or Ballast/Driver	Luminaire or other load needs to be able to receive a signal from the control system.	Can have lower power consumption as conditions change.	Adds cost and complexity to lighting system.	Solid-state Lighting (SSL) has a great potential to be controlled in many ways.
Sensors and Input Devices	Multiple sensor types send signals to a central network.	Allows a unified control strategy.	All control devices must be compatible.	A networked system allows for easier monitoring and reporting.
Occupancy/ Vacancy	Sensors that gather data in infrared, ultrasonic, micro-phonic, and/or video modes.	Cost-effective energy savings.	Knowing which sensor type to deploy can be challenging.	Combined sensors are called dual-technology.
Daylighting	Open loop or closed loop photosensors, weather data, and astronomical time clocks can be used.	In a well day lit space, electric lighting can be OFF or dimmed during most of the day.	Many buildings do not have adequate daylighting. Commissioning of daylighting controls can be complex.	The zone closest to windows and skylights yield most of the savings.
Time Clock (Astronomical)	Electronic time clock that self-adjusts for daily changes in sunrise and sunset times.	Self-adjusting timers, particularly for perimeter spaces, can increase energy savings.	Requires unit to be set to the proper geographical location.	When combined with photocells this can be a powerful tool to maximize savings in daylit areas.
Manual Control	User ability to override (lower) the lighting control.	Studies show that occupants often set the lighting levels lower than the automatic settings.	Requires a user interface that is intuitive and rugged for long term use.	Giving occupant control of the lighting can aid in productivity.
Communication Mode	Control signals are carried through open or closed systems. The communications protocol can be open source or manufacturer specific.	There are a variety of ways that the control signals can reach the lights.	System compatibility and interoperability are concerns. All components need to be able to interface correctly.	Cloud based systems can allow control from a wide variety of locations. Closed network systems may be more secure.
Wireless	Portions of the system can communicate without wires. This can be done with radio, Bluetooth, WiFi, or light signals.	Using wireless controls can lower installation costs.	Not all spaces are suitable for wireless signals.	Systems can be a "mesh network", allowing for increased robustness of control signals.
Wired	There is a wire linkage from the controller all the way to the luminaire. This can be dedicated control wires, line carrier, or Ethernet.	Wired systems are less prone to interference problems than wireless.	Wired systems take more planning and higher first costs, especially in existing buildings. It may not be practical to install control wires.	Some installations use power and control over Ethernet (PoE). This is only possible with modern low power SSL lighting.
Intermediate "Black Boxes"	Translate and deliver commands from sensors or user interface to the lighting.	System persistence by updating protocols if enabled.	As more components are included, there are more failure points.	A distributed power system requires less heavy wire.
Networked User Interface	Allows programing, commissioning and real time adjustment of the lighting system.	A networked system allows changes to be made from a central location. Reports can be generated.	Requires integration with IT systems.	A GUI can ensure that the system is easy to use and program.

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