



Light is Versatile

Solving Real-World Problems with a Flexible Light Management System

Light is OSRAM

OSRAM

Four Ways Lighting Control Systems Solve Real World Problems

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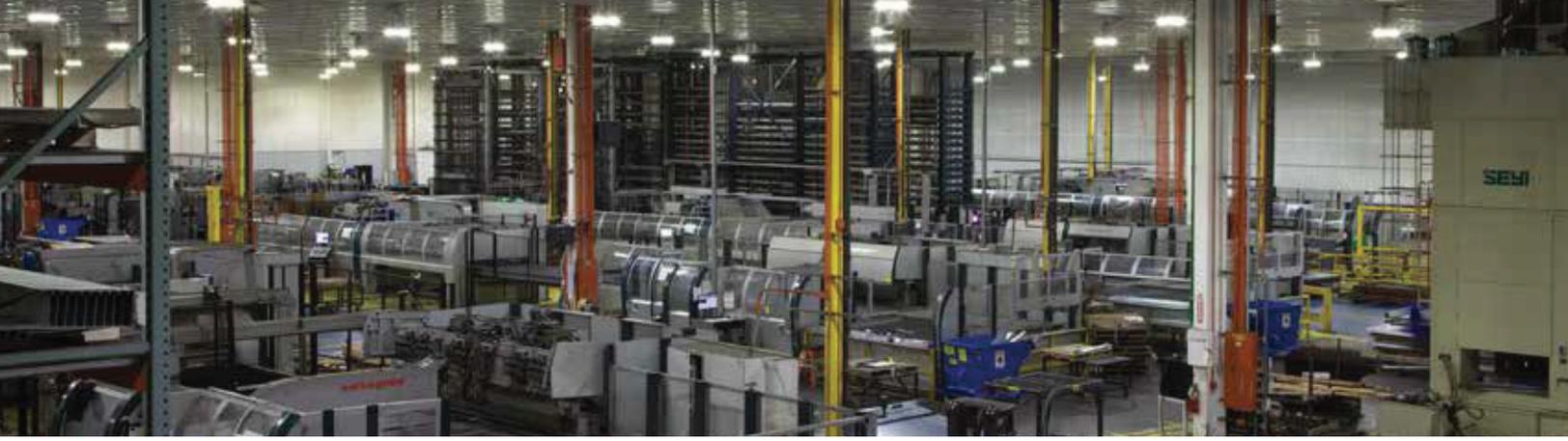
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AAON

Improve Comfort, Productivity
and Safety in the Workspace





AAON

Tulsa, OK

Progressive manufacturing company leverages a flexible lighting control solution to create a more comfortable, productive and safe space for its workers.

The Situation

AAON designs, manufactures and sells semi-custom heating, ventilation and air conditioning (HVAC) equipment for commercial use. Founded in 1988, the company’s broad product portfolio serves both the new construction and replacement markets. AAON, which employs over 1600 people, has received numerous honors and awards in recognition of product innovation and successful business performance.

AAON’s Tulsa, OK location, a combination of offices and manufacturing facilities, is one of the largest manufacturing facilities in the region. With space over 1.3 million square feet, the company uses a significant amount of power every day. In fact, prior to installing the ENCELIUM® Networked Light Management System, AAON had been approached with incentives by the local utility company to reduce hours of operation during critical peak periods as a means of avoiding a local brownout situation.

Although unusual for this type of manufacturing space, a T-bar ceiling with white acoustic tiles has been installed across the entire space hiding unsightly pipes, wires and venting, while also providing a layer of insulation that helps optimize heating and cooling the facility. A total of five different ceiling heights are utilized due to varied equipment and manufacturing requirements.

The Solution

The ENCELIUM® Networked Light Management System is deployed across 1 million square feet of AAON manufacturing space and consists of an ENCELIUM GreenBus II® communication network, wired and wireless control managers, support units and modules, and occupancy sensors distributed throughout the space.

AAON committed to replacing their traditional fluorescent and metal halide fixtures with 0-10V dimmable LED technology, and selected one luminaire for deployment across the entire facility. The ENCELIUM System controls approximately 1500 lighting fixtures installed throughout the facility. The vast majority of fixtures are set up for individual control to minimize rewiring as requirements change. Zonal control is limited due to the requirements of the space.

Goal:

To reduce energy usage and related operating costs in a challenging multiple ceiling height environment.

Solution:

ENCELIUM® Networked Light Management System

Approximate Energy Savings

60%

Square Footage 1.3 Million

Space Type Office and Manufacturing

Vertical Industry Manufacturing



To accommodate equipment and manufacturing requirements, AAON's unique space has multiple ceiling heights ranging from 20.5' to 35'. Uneven ceiling heights create inconsistent light levels that can be problematic for worker comfort, productivity and even safety. To create a uniform level of light, the ENCELIUM System groups luminaires located at different ceiling heights into different task tuning levels ranging between 45 and 70% of maximum light output. Task tuning is one of the energy management strategies that AAON is leveraging to significantly reduce energy consumption and related operating expenses, while making the space more comfortable for employees.

AAON is also poised to take advantage of greater utility incentives for load shedding. The ENCELIUM System is flexible, enabling AAON to reduce the facility's energy usage, particularly during system-wide peak demand periods, by dimming or turning off different individual luminaires or zones with the click of a mouse.

Additional energy savings measures employed include occupancy sensors installed to turn off lights when space is unoccupied. In spaces without occupancy sensors, time schedules are used that switch the lights off during expected unoccupied periods, requiring user requests to keep the lights on. Daylight sensors are also used for dimming down lights (ambient and task) as daylight increases, with dimming up lights by user requests.

The T-bar white tiled ceilings' reflectance has added further efficiency to the light fixtures. As an added bonus, the ENCELIUM System is linked to AAON's existing security cameras via Niagara AX to enhance the security system within the plant.



“ENCELIUM is flexible and easy to work with. Dashboards report our lighting energy consumption in real-time, and we can make adjustments to specific zones or individual luminaires from a workstation in our main office. Even with all the different ceiling heights in our manufacturing area, we now have consistent lighting where needed which has greatly improved our working environment.”

- AUSTIN EMBRY, AAON FACILITY PROCESS ENGINEER

By implementing specific energy management strategies including task tuning, load shedding, time scheduling and occupancy sensing, the ENCELIUM System has enabled AAON to reduce its lighting energy consumption by over 60%, an annual operating cost savings of more than \$100,000. Working closely with OSRAM, AAON was able to garner a one-time custom rebate from its utility company on top of its lighting fixture retrofit rebate. AAON's return on investment (ROI) for the ENCELIUM System is less than 3.5 years.

Bryan Medical Center
Directly Impact Critical Decision-making
and Streamline Workflows





Bryan Medical Center

Lincoln, NE

Medical center employs a flexible lighting control solution that directly impacts critical diagnostics and work flows; empowers office workers to set their own light levels.

The Situation

Bryan Medical Center is a Nebraska governed non-profit health system that cares for patients, educates tomorrow’s health care providers and motivates its community with fitness and health programs. Located in Lincoln, Nebraska and serving patients throughout Nebraska as well as parts of Kansas, Iowa, South Dakota and other states in the region, the organization has an extensive network of doctors, hospitals and medical providers across a wide range of services and specialties including cardiology, neuroscience, vascular, emergency departments, intensive care, women’s and children’s health, a Level III NICU and a Level II Trauma Center. The organization also brings care and treatment directly to rural communities through sophisticated mobile diagnostic and treatment services, telemedicine services, specialized heart care clinics, telehealth mental health counseling and more.

Bryan Medical Center facilities total approximately 3 million square feet across two campuses and lighting control requirements vary within the space. A flexible, reliable, forward-thinking system that could support a wide range of environments and lead Bryan Health into the future was required. Although each campus is managed separately, a user-friendly, centralized lighting control system with advanced data visualization and dashboards was essential.

The Solution

The ENCELIUM® Networked Light Management System has revolutionized what Bryan Medical Center can do with lighting. “We have been installing ENCELIUM throughout the facilities as we remodel areas or change out fluorescent lights for energy-efficient LED technologies,” said Mike Wiruth, Master Electrician, Bryan Medical Center. “I’m not aware of any system on the market with as much flexibility as ENCELIUM. It is an amazing system. For instance, we’ve been able to empower office workers to set their own light levels in their workspace to suit their needs on a given day.” In addition to increased individual comfort, the number of routine calls made to facilities and the Help desk noticeably dropped. An occupancy sensor installed in each cube shuts off the lights when the office is not in use which according to Wiruth has been their highest energy saver.

Goal:

As part of a remodeling effort spanning two campuses, leverage a flexible, reliable, forward-thinking networked light management system that can support a wide range of environments and reduce energy usage and related operating costs.

Solution:

ENCELIUM® Networked Light Management System

Approximate Energy Savings

57%

Square Footage 3 Million

Space Type Medical Facility

Vertical Industry Healthcare



There are a number of additional benefits Bryan Medical Center has realized with the ENCELIUM System installation including improved lighting that directly impacts critical diagnostics and improved work flows. As an example, lighting control is particularly important in the special procedures room where radiology scans are reviewed. In the past, Bryan Medical Center used a hard-wired solution for this area but radiologists found controlling the light levels cumbersome. “With ENCELIUM, our radiologists and attending physicians have seen an extreme improvement in the quality of lighting and the user interface,” added Wiruth. Different task tuning levels are automatically incorporated in lighting scenes enabling highly accurate diagnosis. For convenience, lighting scenes are triggered using a foot pedal for hands-free viewing. Additionally, a lighting control Sensory Interface Module (SIM) monitors a set of contacts on an X-ray machine which automatically triggers the lights to a custom scene when the machine is in X-ray mode and then reverts to the original scene when it goes out of X-ray mode, saving staff the time and effort of manually adjusting the lights.



The conference area at Bryan Medical Center facilities management is leveraging the flexibility that the ENCELIUM system offers. Curtain dividers can split a large conference room into smaller rooms for more intimate gatherings or when multiple meetings are taking place. Multiple scenes are pre-programmed into an ENCELIUM controller that is located ‘behind the scenes’ in a storage room. When the room is booked, the scheduler also identifies the appropriate lighting scene required, streamlining operations while saving energy.



“With ENCELIUM, our radiologists and attending physicians have seen an extreme improvement in the quality of lighting and the user interface,”

- MIKE WIRUTH, MASTER ELECTRICIAN

Little things add up and having a simple switch in the right location can be a time-saver and help streamline operations. Bryan Medical Center facilities management is leveraging the ENCELIUM system network for some easy conveniences. A simple switch connected to the ENCELIUM system was installed at the nurse’s station to open the ambulance garage door. Similarly, the lights on the heliport can now be controlled from the Emergency Department, six floors below, using a basic switch connected to the ENCELIUM system.

Carnegie Mellon University
Integrate Best-in-Class
User Experience





Carnegie Mellon University

Pittsburgh, PA

Flexible lighting control system enables Carnegie Mellon University’s Robert L. Preger Intelligent Workplace Research Lab to integrate best-in-class user experience while reaping a 70% savings in energy consumption.

The Situation

Carnegie Mellon University (CMU) is a global research university with more than 13,200 students, 100,000 alumni, and 5,000 faculty and staff. CMU has been a birthplace of innovation since its founding in 1900 and today, the institution is a global leader bringing groundbreaking ideas to market and creating successful startup businesses. The award-winning faculty members are renowned for working closely with students to solve major scientific, technological and societal challenges, putting a strong emphasis on creating things—from art to robots. With 100 percent of CMU’s electricity coming from green power sources, the university is ranked as a green power leader by the U.S. Environmental Protection Agency.

As part of a research project funded by the Department of Energy, CMU installed the ENCELIUM® Networked Light Management System to control their primarily fluorescent lighting system in a 7,000 square foot Robert L. Preger Intelligent Workplace, a research lab that studies the integration of different technologies and their impact on human comfort. In the lab, researchers look at user behavior and the types of mechanical systems and technology needed to maximize performance. A flexible lighting control system was required to serve as the backbone for research on user interfaces. In the lab, approximately ten students, seven faculty and staff, and 50 master’s students look at the integration of different technologies and their impact on occupant comfort. The lab relies a lot on natural daylight and does not use much artificial lighting during the day.

“In the lab, we look at user behavior and what type of mechanical systems and technologies are needed to maximize performance. We create computer models of a building’s thermal behavior and lighting consumption and how occupants in the structure can be expected to perform,” said Bertrand Lasternas, senior research scientist at Carnegie Mellon University and manager of the ENCELIUM system in the living lab. “The flexibility of the ENCELIUM system enables us to efficiently support research in the lab while reducing energy consumption.”

Goal:

To deploy a flexible lighting control system to maximize the workspace environment and save energy in the process.

Solution:

ENCELIUM® Networked Light Management System

Approximate Energy Savings

70%

Square Footage 7,000

Space Type Lab

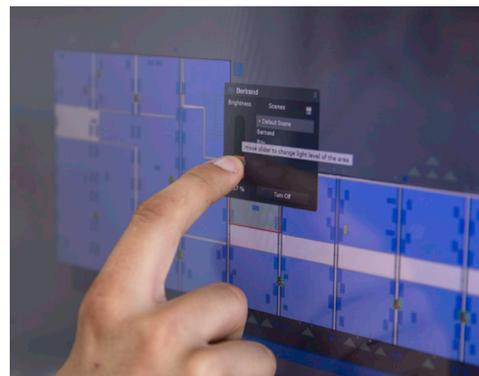
Vertical Industry Education



The Solution

The ENCELIUM® Networked Light Management System is scalable and enables facility managers to cost-effectively enhance occupant experience of their lighting spaces with just a click of the mouse. The system is a proven, flexible, and cost effective way to manage a lighting space. It is one of the only lighting control systems that can gather data from a range of lighting component suppliers to tailor lighting usage with changing requirements – helping to make buildings fit for the future. At the core of the solution, Polaris 3D® software facilitates the commissioning, usage and data analysis of the lighting installation and is accessible anytime, anywhere via an Internet connection. The Polaris 3D® color dashboard shows how efficient an installation is and immediately reports the energy savings achieved.

CMU uses the ENCELIUM system in the lab to control the lighting in the open space, assigning and changing zones quickly and easily. The lab has touch screens on the walls to set up scenes and control the lighting in different areas. Typically, with three button wall controls, scenes range from the highest light output on the top while the middle and bottom buttons control lower light levels. CMU researchers recognized that users automatically push the top button and are satisfied with the full light output, without even trying the lower light levels. CMU used the ENCELIUM system to re-program the buttons so that the top button controlled the lower illumination. This resulted in energy savings estimated at 70 percent, with no decrease in user satisfaction and task performance.



“The flexibility of the ENCELIUM system enables us to efficiently support research in the lab while reducing energy consumption.”

- **BERTRAND LASTERNAS**, SENIOR RESEARCH SCIENTIST AT CARNEGIE MELLON UNIVERSITY

Additional energy conservation measures include the installation of a variety of sensors. Occupancy sensors turn off lights when no presence is detected. In the spaces with no occupancy sensors, time schedule is used, automatically switching off the lights during projected unoccupied periods. Daylight sensors dim ambient and task lights as daylight increases and turn up lights when requested.

Always focused on innovation, CMU is tapping into the flexibility of the ENCELIUM system to add user-control advancements. A new app allows users to control the lighting from their mobile device. They are also experimenting with additional user interfaces like voice recognition for controlling the lights, in addition to other aspects of the office environment such as window blinds.

Hurst-Euless-Bedford
Independent School District
Meet Unique Needs of Specific
Demographics and Tasks





Hurst-Eules-Bedford Independent School District

Texas

Flexible lighting control system allows HEB school district to create customize lighting to meet the unique requirement of its, students, staff and faculty.

The Situation

The Hurst-Eules-Bedford Independent School District (HEB ISD) is recognized across the state of Texas and nationwide for its superior curriculum, low teacher-student ratios, and a singular focus on instructional spending. This fine-tuned combination consistently makes it the district of choice for families that want their children to have an academic edge. The school district has a proud tradition of excellence as a diverse, high-performing organization committed to ensuring each student is empowered today to excel tomorrow.

HEB ISD makes a conscious effort to reduce expenses that are not focused on student achievement. In support of this effort, utility expenses are stringently managed by taking a holistic approach to energy consumption and incorporating the latest technologies. The result? HEB is one of the most energy-efficient school districts in the state. In fact, the school district's energy program continues to stay one step ahead of the state's energy code.

Looking to the future, HEB ISD sought a centralized lighting control system that would support each classroom's unique requirements and easily scale with more classrooms and buildings implemented over time.

The Solution

HEB ISD chose the ENCELIUM® Networked Light Management System based on a recommendation from a lighting architect and after extensive system testing in a portable classroom. Three newly constructed facilities – the Viridian Elementary School in Arlington, Texas, the Gene A. Buinger Career and Technical Academy in Bedford, Texas, and the Auxiliary Services Center in Eules, Texas – now leverage the capabilities of this smart lighting solution.

With the knowledge that lighting directly affects learning, every Viridian Elementary classroom's lighting is customized to meet the unique needs of particular tasks and classroom areas using the ENCELIUM System's task tuning capability. Lighting is programmed in the pre-kindergarten classroom to accommodate nap time. All lights are shut off while the children are resting except

Goal:

Flexible light management system that provides the best environmental conditions for the least expense.

Solution:

ENCELIUM® Networked Light Management System

Approximate Energy Savings

57%-65%

Square Footage 91,681

Space Type Classrooms and Academic Administration Space

Vertical Industry Education



those over the teacher's desk so that she can continue to work. A special education classroom leverages a mild lighting setting to protect students from overstimulation. And, when a supervisor was experiencing migraines after bright LEDs were installed in his office, a click of a mouse in the ENCELIUM System dimmed his office lighting to better meet his personal preferences and his migraines stopped.

Occupancy sensors employed in all three buildings ensure that lighting is off when a room is unoccupied and turn on automatically when someone enters. This significantly reduces energy consumption in buildings that are often empty in the evening, weekends and during vacation periods. When classes are in session, corridor lights are set to a low 30% to save energy, and automatically brighten when someone enters the corridor.

“The move to the ENCELIUM System was a big step for our district and we had a lot riding on that decision. It's really paying off in student comfort, educational experience and energy savings. It does everything I need it to do and then some,”

- LARRY PARKER, ENERGY MANAGER OF HEB ISD

The ENCELIUM System's user-friendly energy consumption dashboards enable HEB ISD to easily adjust lighting where needed. System data on energy consumption is shared with other energy-focused organizations including the Texas Energy Managers Association (TEMA) where Parker serves as Chapter Vice President. The data is being used as the basis for an Energy Report Card for all of the district's academic buildings.

“I joke that I am a flexible control freak. The ENCELIUM System allows me the flexibility of functional control so that I can provide our customers the best environmental conditions for the least expense,” said Josh Minor, Director of Maintenance and Operations of HEB ISD.

The average energy cost for lighting in HEB ISD academic buildings that have not installed the ENCELIUM Networked Light Management System, is 50 to 70 cents per square foot. In contrast, the buildings with the ENCELIUM System are dramatically lower at just 23 cents per square foot with an overall energy cost savings of 56-65%. Additionally, HEB ISD received a \$26,000 rebate from its utility company for the Viridian Elementary School alone.

Plans are currently underway to retrofit three additional district elementary schools with the ENCELIUM System. In the future, HEB ISD hopes to integrate the ENCELIUM System with other Building Management Systems (BMS) including HVAC.



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