Cutting-edge lighting control for optimum building management

How sceneCOM evo is making buildings more efficient

Use case: Healthcare

Editorial

Building technology is becoming increasingly complex and digitalised, where cost efficiency and sustainability are becoming more and more important. Smart lighting controls play a central role in the move towards building automation. When seamlessly integrated into a comprehensive building management system, they offer numerous advantages.

sceneCOM evo, Tridonic's family of smart, DALI 2-based lighting control solutions, provides the appropriate technologies and interfaces to deliver these advantages, allowing facility managers to take lighting infrastructure control and maintenance to a new level. This smart solution provides the data required to predict, to locate and rectify acute faults quickly and effectively. The control system also supports management of the emergency lighting and, thanks to energy data, the LEED certification of buildings.

Current challenges
What you need to know

The digitalisation and increasing complexity of building technology

As in many areas of building technology, digital transformation is progressing at a rapid pace. This has a profound impact on facility management. New technologies such as the Internet of Things (IoT), artificial intelligence (AI) and the analysis of large amounts of data offer a wide range of opportunities to increase energy efficiency. At the same time, many aspects of the processes need to be rethought and substantially adapted.

Cost pressure and process efficiency

Facility managers are also faced with the challenge of increasingly having to provide innovative services while at the same time reducing costs. What is needed is a balance between maximum process efficiency and acceptable service quality. An additional factor is the omnipresent shortage of skilled labour, which is having a significant impact on the building management sector.

It is becoming increasingly difficult to recruit qualified personnel who are familiar with the new technologies. Facility managers must therefore be able to maintain and service the entire building infrastructure throughout its life cycle with minimal effort. This would allow staff shortages to be cushioned and costs minimised.

The increasing complexity of building technologies makes the implementation, operation, management, maintenance and servicing of such systems difficult.

Quick troubleshooting is key

Technical faults, errors and problems in the entire building ecosystem need to be located, analysed and rectified quickly and efficiently. This applies in particular to the entire lighting infrastructure. The level of digitalisation, networking and automation of systems and devices is increasing particularly rapidly here, which in turn increases complexity and poses further challenges for facility management. It is important to seamlessly integrate the lighting controls and all corresponding components into a comprehensive building management system to pave the way for end-to-end workflows and raise process efficiency to new heights.

High standards for sustainability and environmental protection

And last but not least, facility management today has to meet high standards in terms of sustainability and environmental protection. The task here is to identify energy-efficient solutions and implement them as part of carefully considered building management concepts. It is estimated that buildings are responsible for around one third of all CO_2 emissions. Sustainable building management can therefore save considerable amounts of CO_2 – a decisive factor in the move to a climate-neutral future.

32 %
OF ALL CO_2 EMISSIONS ARE CAUSED BY BUILDING SYSTEMS

Sustainability as a discipline of the future
Successfully overcoming challenges

Digitalisation is playing an increasingly important role in helping facility managers to achieve their sustainability goals. By using data analyses, forecasting models and artificial intelligence, facility managers can monitor the performance of their buildings more closely, allowing them to quickly identify problems and develop strategies for reducing the environmental impact.

In addition, AI-supported automation solutions enable building managers to organise time-consuming tasks more efficiently and with fewer resources than before. Suitable tasks include planning maintenance work and monitoring building performance because reduced energy requirements inevitably lead to reduced operating costs.

The benefits of digital technologies

- **Precise monitoring** of building performance
- **More efficient and resource-saving organisation** of time-consuming tasks
- More efficient **planning of maintenance work** (predictive maintenance)
- Understanding of needs and creation of **better user experiences**
- Extension of product life cycles

Forecasting models enable facility mangers to predict and plan maintenance work (below)
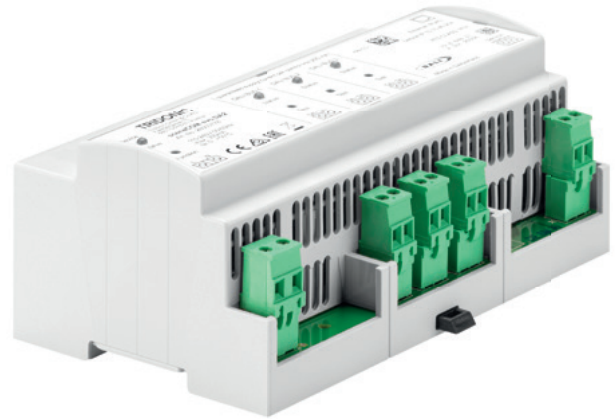
Smart lighting controls
Key technologies from Tridonic

Smart lighting management solutions such as sceneCOM evo from Tridonic play a decisive role. They provide the basis for centralised, digital control, monitoring and maintenance of modern lighting systems for individual rooms, floors or even entire buildings. The technology applied either wirelessly or wired, is suitable for both indoor and outdoor use – especially for car parks, pavements, access roads and small parks that are part of a building complex.

As a standardised protocol for digital lighting control, DALI (Digital Addressable Lighting Interface) technology forms a solid platform for smart lighting management. It allows the relevant systems in a building to be precisely controlled and scaled or adapted as required. A particular advantage of DALI is the option of connecting, individually addressing and controlling various light sources via a single electrical cable.

Thanks to integrated interfaces, sceneCOM evo can be seamlessly connected to the existing building technology.

DALI-2 for greater flexibility and efficiency

sceneCOM evo is based on DALI-2, a further development of the DALI standard. Thanks to certification by the Digital Illumination Interface Alliance (DiiA), DALI-2 offers significantly higher quality and interoperability between different manufacturers. DALI-2 is also backwards compatible with the previous DALI standard, offering extended grouping possibilities and increased capacity. This means that 128 addresses such as luminaires, sensors or drivers can be controlled on each DALI line. Thanks to DALI-2, sceneCOM evo provides greater flexibility and efficiency for lighting systems.

Seamlessly connect controls to building management systems

A particular advantage of sceneCOM evo is its universal compatibility. Thanks to integrated interfaces, the control solution can be seamlessly connected to the building management system, for example via the standardised BACnet (Building Automation and Control Network), MQTT (Message Queuing Telemetry Transport) and REST-API (Representational State Transfer – Application Programming Interface) data communication protocols the control solution becomes an integral part of holistic building management systems (BMS). The solution can be customised in terms of its range of functions and scaled according to individual requirements. The systems can also be extended at any time with wireless components or additional DALI control devices, for example. Facility managers are therefore able to adjust the lighting precisely to suit the particular rooms and prevailing conditions.

Automating lighting controls using time profiles and sensor values

The entire lighting control process can be automated and integrated into the building management system using sceneCOM evo. Depending on certain parameters such as time of day and year, the system automatically sets specific light scenes to create an atmosphere that supports people's well-being. In addition, sensors detect movement and the amount of available daylight use this information to automatically adjust the lighting controls. This high level of automation allows luminaires to be more efficiently controlled and cost savings to be made. The lighting can still be manually controlled if required. For example, users can switch individual or grouped luminaires on or off, dim them, change their colour temperature in line with human centric lighting criteria or even define static light scenes.

Effective error management for smooth operation

To guarantee the smooth operation of the entire lighting infrastructure at all times, effective error management is essential. sceneCOM evo offers a wide range of functions that enable this process to be largely automated. Through continuous monitoring, errors and malfunctions can be reliably detected and precisely located. Relevant information is clearly displayed on a dashboard. On this basis, engineers can now rectify the error exactly where it was diagnosed.

Information base for predictive maintenance

The system also shows the type of malfunction in question. For example, if there is a short circuit, an open circuit or a device failure, engineers can correct the fault and reset, reconfigure or completely replace the device. The fault management workflow not only serves to fix faults as they occur, but the information can also be used to anticipate potential faults and thus successfully avoid them in future. In the long term, this contributes to the stable, reliable operation of all luminaires and facilitates predictive maintenance.

Automated testing of the emergency lighting

The emergency lighting is an important technological component of any building. Emergency lighting and escape-route luminaires must function reliably in order to guide and orientate the people in the building in crisis and emergency situations. It is therefore essential for these luminaires to be tested regularly. To do this manually would require lots of personnel, time and effort, and therefore high costs.

sceneCOM evo allows this process to be entirely automated. Scheduled statutory duration and functional testing of the emergency lighting can be easily controlled and carried out via remote access. This eliminates the need for time-consuming manual inspection and documentation of the emergency luminaires, which saves significantly on costs.

A web application is used for monitoring and remote access. Special software promptly reports the current error status of the emergency lighting and any malfunctions. Facility managers can thus repair or replace faulty luminaires or batteries in good time.

Lighting performance report: insights into current performance data

sceneCOM evo offers another useful feature to support fault-free operation of the lighting system, namely the Lighting Performance Report, Based on continuous monitoring, it delivers clear insights into the performance of the lighting system during its entire life cycle. Not only does this help to improve operation of the existing systems, but the latest performance values also form a solid basis for optimised planning, installation and commissioning of new devices.

The technology records, collects, analyses and checks performance data and compares it with the desired user lighting applications and generates a comprehensive report. Based on this data, potential energy savings can be identified in close consultation with the customer. This also includes modifications and newly developed applications to improve the performance of the lighting system throughout its life cycle and to increase energy efficiency.

High-tech hospital
sceneCOM evo, the smart lighting management system

The Nuovo Ospedale Galeazzi Sant'Ambrogio in Milan (Scientific Institute for Research, Hospitalisation and Healthcare / IRCCS) is a hospital of superlatives: it has a total area of 150,000 square metres spread over 17 floors. 1,200 employees treat and care for over 340,000 patients a year. As a "hospital of the future", the health centre, which opened in August 2022, meets the latest standards of sustainability and functionality in terms of architecture and technical equipment.

"The main advantages of integrating a lighting control system in the building management system lie in the possibility of monitoring and optimising operation of the lighting system and the associated power consumption in real time."

Au Yeong Pak Kuan, Project leader
Tridonic GmbH & Co KG

Smart lighting management for the "hospital of the future"

Tridonic's technical contribution here is considerable working with local partners to equip the high-tech hospital with a smart lighting management system. Tridonic supplied 210 sceneCOM evo DALI-2 controllers, which are used to automatically monitor and digitally control 16,000 dimmable LED luminaires with 6,000 presence and daylight sensors and 2,500 dimmer switches.

Innovative lighting concept for a pleasant room atmosphere

As the project progressed, the advantages of sceneCOM evo really came into their own. The lighting infrastructure could be easily and flexibly adapted to each changing requirement via individually configurable user profiles. Ten different room profiles define the dimming level and the responses of the sensors and light switches to meet the requirements of the various spaces such as stairwells, patient rooms, corridors and cafeterias.

This innovative lighting concept creates a pleasant atmosphere in the room, makes treatment more agreeable and thus helps significantly improve patient well-being. The lighting controls are fully integrated into the hospital's building automation system via BACnet and MQTT API interfaces to the Siemens DesigoCC automation system and to the DEOP energy management system respectively.

If a motion sensor detects presence in a room, this information is shared with the Siemens room automation controller via the BACnet interface. Depending on the room occupancy applications, the temperature of the room can then be heated or cooled depending on the time of the year. In addition, device failures, luminaire dimming and sensor lux levels are communicated via the BACnet interface to enhance building operations and maintenance purposes. All in all a total about 45,000 BACnet lighting points are exchanged with the room automation controllers throughout the building.

The intelligent interplay of lighting controls and building automation increases the level of automation and ensures greater user comfort throughout all the rooms in the hospital.

Find out more about Intelligent lighting control for the hospital of the future on our YouTube channel.

Coordinated lighting scenes support patient well-being and recovery (top),

Pleasant atmosphere in the entrance area (left),
the "corridor" room profile is activated when a motion sensor is triggered (left)

Daylight harvesting kicks in where natural light illuminates the walkways (bottom)

LEED certification for outstanding sustainability

In this use case, sceneCOM evo not only exhibits impressive levels of innovation, flexibility and usability, but also ensures maximum sustainability. The smart control system optimises light usage based on available daylight to minimise power consumption. This supports the hospital's sustainability strategy and complements the huge investments in environmentally friendly technologies throughout the whole building.

In particular, thanks to excellent energy efficiency, the sceneCOM evo lighting management system made a significant contribution to gaining LEED v4 GOLD certification for outstanding sustainability.

Effective implementation even under difficult conditions

Tridonic completed this extensive, complex project within a 24-month implementation phase – during the Covid-19 pandemic – with a small team of 10 specialists. Despite numerous site challenges throughout the construction phase, Tridonic managed to deliver the entire project on time and to the satisfaction of the project owner and the general contractor.

In a nutshell the success of the project was down to Tridonic's professional team combination of Tridonic & Zumtobel (AT) and Forlani Impianti (IT). Proficient project and risk management, knowledgeable engineers from all parties, close communications with the general contractor and good foresight were all key ingredients for world class project execution.

Entrance to the A&E department (top),
Outdoor lighting (2nd from top),
The university auditorium with a 450 seating capacity (2nd from the bottom),
Underground car park lighting (bottom)

Summary
Benefits of the sceneCOM evo smart lighting solution

Today's facility managers are facing multiple challenges, including the increasing digitalisation and complexity of building technology, growing cost pressures and the need for maximum process efficiency. As a result, technical faults must be quickly located and rectified.

These challenges can be successfully overcome with smart lighting management solutions such as the sceneCOM evo from Tridonic, which has multiple benefits. The technology
- integrates seamlessly into the building management system
- does not require additional software for configurations and commissioning
- includes an in-bulit webserver which allows for direct system application access via a web browser
- can be adapted and scaled according to individual requirements
- guarantees smooth operation thanks to effective diagnosis and fault management

- automates the entire lighting control process
- enables automated testing of the emergency lighting
- provides a clear overview of the latest performance and energy data
- supports certification according to the LEED standard for optimum sustainability.

sceneCOM evo is being used successfully in this state-of-the-art hospital in Milan, where the technology really comes into its own, providing the basis for automated control processes and contributing to patient well-being thanks to customisable room profiles. The lighting management system also delivers excellent energy efficiency, thus supporting the hospital's sustainability strategy.

Presence worldwide

AUSTRALIA
Tridonic Australia Pty Ltd
2/7 Millner Ave
Horsley Park, NSW 2175
Australia
T +61 2 9832 6600
F +61 2 9832 6688
www.tridonic.com
infoau@tridonic.com

AUSTRIA
Tridonic GmbH & Co KG
(Headquarters)
Färbergasse 15
6851 Dornbirn, Austria
T +43 5572 395-0
F +43 5572 20176
www.tridonic.com
sales@tridonic.com

Tridonic GmbH & Co KG
Sales Austria
Archenweg 58
6022 Innsbruck, Austria
T +43 512 3321 554
F +43 512 3321 995554
www.tridonic.com
vertrieb.austria@tridonic.com

CHINA
Tridonic (Shanghai) Co., Ltd.
(Headquarters)
Room 602, Buliding B
Zhongshan International Plaza
No. 789 Tianshan Road
Shanghai, 200335, China
T +86 21 52400 599
F +86 21 52400 230
www.tridonic.com
china@tridonic.com

Tridonic (Shanghai) Co., Ltd.
Beijing Branch
Room 1207, No. 3, Yard 1
Tian Xin Street,
Fang Shan District
Beijing, 102446, China
T +86 10 6522 6163
F +86 10 6522 7003
www.tridonic.com
china@tridonic.com

Tridonic (Shanghai) Co., Ltd.
Guangzhou Branch
Room 505, R & F Profit Plaza
76 Huangpu Xi Road, Tianhe District
Guangzhou, 510623, China
T +86 20 3839 2483
F +86 20 3839 2482
www.tridonic.com
china@tridonic.com

FRANCE
Tridonic France SARL
8 Rue de Bruxelles
ZI Krafft
67150 Erstein, France
T +33 3 88 59 62 70
F +33 3 88 59 62 75
www.tridonic.fr
info.france@tridonic.com

GERMANY
Tridonic Deutschland GmbH
Edisonallee 1
89231 Neu-Ulm
Germany
T +49 731 176629-0
F +49 731 176629-15
www.tridonic.de
vertrieb.deutschland@tridonic.com

ITALY
Tridonic Italia srl
Via G. Savelli, 86
35129 Padova
Italy
T +39 049 89 45 127
www.tridonic.it
vendite.italia@tridonic.com

KOREA
Tridonic Korea LLC
Mark Kim
#808 HanHwa BizMetro II
551-24 Yangcheon-ro
Gangseo-gu Seoul
Republic of Korea (South)
T +82 10 9922 3878
www.tridonic.kr
mark.kim@tridonic.com

MALAYSIA
Tridonic Malaysia Sdn Bhd
V03-10-01 Designer Office,
Lingkaran SV,
Sunway Velocity, Cheras
55100 Kuala Lumpur
Malaysia
T +60 3 2733 6484
T +60 3 2733 6485
www.tridonic.com
asean@tridonic.com

MIDDLE EAST
Tridonic Middle East (FZE)
Warehouse LB 4 Blue Shed Area,
JAFZA North, Jebel Ali
P.O. Box 17972
Dubai, United Arab Emirates
T +971 4 8833 664
F +971 4 8833 665
www.tridonic.ae
sales.middleeast@tridonic.com

NEW ZEALAND
Tridonic New Zealand
PO Box 71134, Rosebank
Auckland 1348
27 Jomac Place, Avondale
Auckland 1026
T +64 9820 1119
F +64 9820 4471
www.tridonic.com
sales@tridonic.co.nz

POLAND
Tridonic Rep. Office Poland
Poland
www.tridonic.com
marek.michalski@tridonic.com

SINGAPORE
Tridonic S. E. A. Pte Ltd
158 Kallang Way
#06-02
349245 Singapore
Singapore
T +65 6749 9071
F +65 6293 3700
www.tridonic.com
asean@tridonic.com

SOUTH AFRICA
Tridonic SA (Pty) Ltd
Unit A7, Centurion Business Park
Cnr. Bosmansdam Road &
Democracy Way
Milnerton, SA, 7441
South Africa
T +27 21 110 5687
www.tridonic.com
info@tridonic.com

SPAIN
Tridonic Iberia, S.L.
Paseo del Club Deportivo 1
Parque Empresarial La Finca, Edificio 13
28223 Pozuelo de Alarcón
Spain
T +34 916 162 095
www.tridonic.es
ventas@tridonic.com

SWITZERLAND
Tridonic AG
Obere Allmeind 2
8755 Ennenda
Switzerland
T +41 55 645 4747
www.tridonic.ch
vertrieb.schweiz@tridonic.com

TURKEY
Tridonic Aydınlatma TİC.LTD. ŞTİ.
Kemankeş Mah., Necatibey cad.
Akçe Sok., Akçe Han 10
34420 Karaköy / Beyoğlu
Istanbul, Turkey
T +90 212 244 78 05
F +90 212 244 78 06
www.tridonic.com
satis@tridonic.com

UNITED KINGDOM
Tridonic UK Limited
Unit 5 Cherrywood
Chineham Business Park
Stag Oak Lane, Chineham
RG24 8WF Basingstoke
Hampshire
United Kingdom
T +44 1256 374300
www.tridonic.com
enquiries.uk@tridonic.com

USA
Tridonic Inc. USA
3300 Route 9W
Highland, NY 12528
United States
www.tridonic.us
sales.us@tridonic.com

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Headquarters
Tridonic GmbH & Co KG
Färbergasse 15 | 6850 Dornbirn, Austria
T +43 5572 395-0 | sales@tridonic.com
www.tridonic.com | in | ▶