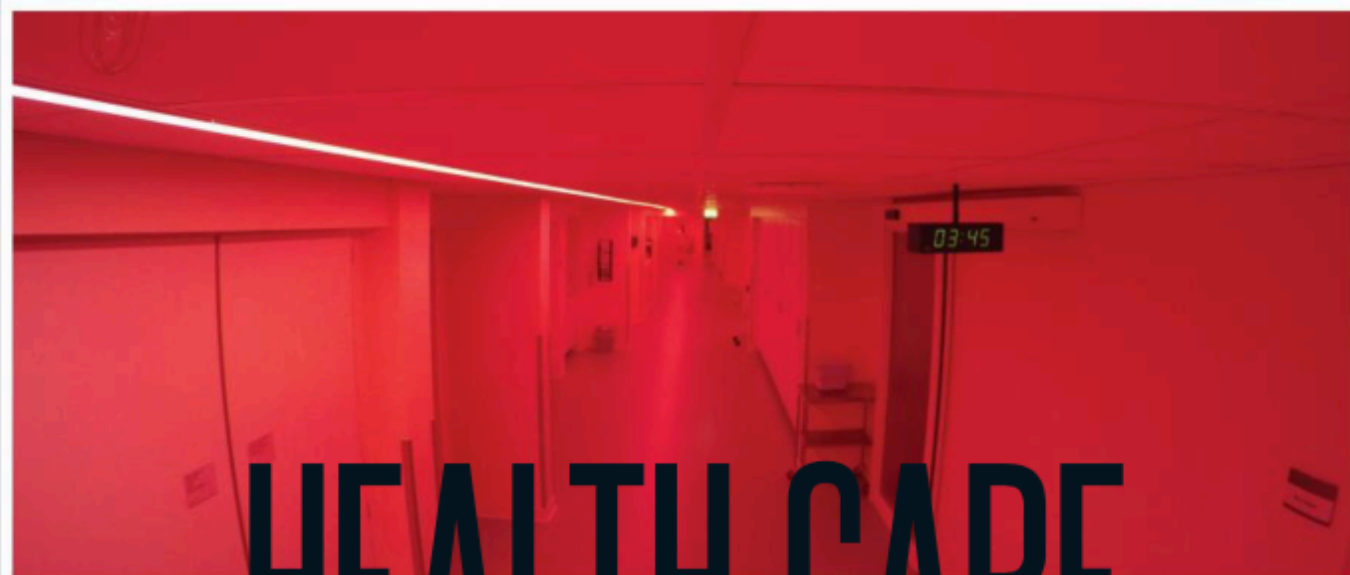


## Lighting in healthcare



# HEALTH CARE

*A Danish lighting company is creating innovative, tuneable hospital and care home lighting schemes that can help with the interpretation of data and test results, improve patient care and recovery and which can be adjusted to patient and staff circadian rhythms*

By Benny Nielsen

**S**ilkeborg is a town located in the geographical middle of Denmark and with a population of more than 45,000 people.

Its main hospital is Silkeborg Regional Hospital, where we at Lightcare were recently involved in an innovative project to install human-centric circadian lighting that, it is hoped, will actually improve diagnosis and patient care.

This article is going to be, in part, about that project. But, as a Danish lighting company that specialises in custom-designed dynamic circadian lighting for the healthcare sector, I also wanted to highlight

some other projects we have been involved in that may be of interest to UK lighting professionals.

What we found in Silkeborg Regional Hospital was that, in areas containing screens with test data and imagery (for example X-rays, ultrasounds, MRIs and CT scans), often the hospital staff were finding that traditional white ceiling or wall LED or fluorescent light would reflect or dazzle on the screen. This was making it harder to read this critical data, and even the risk of confusion of the information on the screen.

In collaboration with surgeons and physi-

cians, these areas have therefore now been fitted with coloured lights that eliminate shadows and highlight structural detail, vital of course to effective interpretation of such images. Tuneable coloured light scenarios can be implemented from a central touch screen, making it easy for staff to switch between individual preferences.

Tuneable lighting is also used in the hospital's offices, its intensive care unit and five of its operating theatres. In the latter area, this lighting helps to optimise visual conditions and create more comfortable conditions for surgeons, doctors and nurses.



### LIGHTING FOR DEMENTIA CARE

Also in Silkeborg, we have recently been involved in a project for the Marienlund Care Facility, a 120-nursing and dementia room elderly care facility. This has proved to be our biggest installation yet, and we are, naturally, very proud of the result.

Key features here include the fact staff can operate all the lights from their staff iPads. Floor sensors in the bedrooms can be used for 'wayfinding', so residents can orient themselves and find their way to the bathroom.

Importantly, the system is fully integrated with the facility's call/alarm system. Therefore, if a resident calls for assistance during the night, the lighting in the room will turn on automatically, at a pleasant level, until a staff member cancels the alarm.

A further innovative project has been the renovation of the intensive care unit at Sønderborg Hospital in the south of Denmark.

One of the features we have been particularly excited about is that staff now have the ability to customise lighting in up to four time periods, with individual settings available for each individual patient.

With this feature, which we call 'Personal Light', it is possible to create user-based variations in the rhythm. So, if you are more of a chronotype B person (or most energetic in the afternoon and evening), you can extend the 'sunrise' to be more fitting to your personal circadian rhythm.

### ZONE-SPECIFIC AND ADAPTABLE

How, then, does this all work? Our proprietary control system is based on Ethernet and DMX/RDM technology to ensure fast response and quality. The control system is zone-specific, so the light can be adapted to individual needs. In the context of these projects, this has meant operating theatres or patient areas, but it could just as easily be applicable to a factory, industrial or office setting.

The system has three essential components: our server with our operating system, the area controller and our unit controller. The server (for example perhaps operating from a touchscreen with user interface) is where our programming, user controls and system analysis are conducted from.

The area controller, then, is the link between the server and our luminaires. From here we can divide the installation into its different areas, group lamps and enable local control from standard switches, sensors, and so on. Each AC can be divided into four individually controlled areas in the operating system. Each AC is assigned



an IP-address and communicates with the server via Ethernet.

The unit controller (UC), on the other hand, is our seven-channel LED driver, and is used for the luminaire control. The UC can power LEDs either with PWM or digital-to-analogue conversion technology. The UC is controlled via DMX/RDM communication, which it receives from the area controller.

### CUSTOMISED COLOUR SPECTRUMS

When it comes to luminaires, we have developed our own LED PCBs, which can be equipped with a range of different LEDs, fitted bespoke to the project at hand. So, for example, in the projects we're discussing here, we used a 2700K warm LED, a 6500K cold LED and an RGB LED.

With these LEDs we are able to customise the exact colour spectrums we need for the project. In the circadian scenes we work with blocking and boosting wavelengths around 460nm in the spectrum.

Besides the circadian light, we can deliver specialised light scenarios, including (within hospitals) clinical light scenarios for venflon (or taking blood or fluid), ultrasound scans, X-rays and so on. The role and value of coloured lighting is also increasingly recognized within sensory stimulation rooms, where we can create coloured scenarios linked to video projectors and scent machines.

But don't just take my word for it. To conclude, here are some comments from some of fantastic nursing staff we have been involved with about how they feel these new schemes have benefited them and their work:

'We are very focused on creating the most effective neurological rehabilitation pos-

sible. Circadian lighting greatly helps to create optimal conditions for both patients and staff. We find that patients get a sense of day and night, and they actually sleep better; it creates peace for the patients. The staff who work at night are pleased with the red-orange nightlight, they find it easier to fall asleep when they get home from night duty.'

Nurse, Karen Meldgaard

'It generally gives a better rhythm for our ICU patients; they have an easier time falling asleep at night. At night they sleep more consistently. I have many evening shifts and find that I have an easier time falling asleep when I get home from duty.'

Nurse Mette Hoff

'It's wonderful to be able to create an evening atmosphere with the right lighting.'

Nurse Marit Haugaard

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