

Technology at The Beeches, Parkhaven Trust

Overview by Whitecroft Lighting for The Hubble Project

Introduction

Any lighting solution must be one that provides a visually comfortable, stimulating and safe environment. Colour appearance can play a key part in this for carers and residents alike.

The Parkhaven Trust chose to invest in a dynamic lighting system, also known as 'human centric lighting'. Through the appropriate selection of light fittings and control system, the colour appearance of the light source and its intensity adjusts to 'mimic' the natural cycle of day and night.

Scientific research has established through a non-visual receptor in our eyes that our body clocks are linked to the day/night cycle. Through the release and suppression of chemicals, triggered by the spectrum of light, this access to light helps regulate our sleep wake cycle and circadian rhythm. Research is still on going into how artificial light can impact us, with an area of potential being the care of the elderly and dementia patients where access to daylight can be limited and sleep patterns often disrupted.

Any dynamic lighting solution must be balanced with the principles of good lighting design. Aspects such as an appropriate level of glare control, correct illumination level for task, uniformity, colour rendition, flicker, controllability of the lighting installation and product quality must also be considered.

Technical specifications about what is in the hub & the infrastructure needed

To deliver a dynamic lighting solution is a combination of the correct light fixture and appropriate lighting control system. The dynamic lighting solution was only applied to the residential areas.

The light fixtures

Within the main residential areas (bedrooms, ensuites, circulation and day rooms), the *Mirage LED Tunable White* downlight was selected: <https://www.whitecroftlighting.com/products/mirage-led-tunable-white/?q=mir>. Various attachments were utilised to create a different feel to spaces, with a bespoke attachment used within the bedroom areas. The luminaire comes complete with 2 different sets of LEDs, one 'warm' LED and one 'cool' LED, and intelligent 'DALI' driver. Through the lighting control system (see further details below) the intensity and colour of the LEDs adjusts throughout the day to adjust the colour spectrum, appearance and feel to the space.

The colour temperature adjusts throughout the day (7am – 7pm) from a 'warm' (3,000K) in the morning to 'cool' (6,500K) in the afternoon back to 'warm' (3,000K) in the evening. Between the hours of 7pm – 7am the lighting was set to 3,000K and in circulation areas to a lower light level to ensure safe egress whilst minimising disruption.

In the event of an emergency, the light fixtures would default to full output and 4,000K.

Other products within the healthcare range from Whitecroft come complete with the capability to adjust in colour temperature, for example Florence+, tunable lighting is available as standard (<https://www.whitecroftlighting.com/products/florence/?q=flor>). Please note that as we have our own specials design team and manufacturing facilities in Greater Manchester this can be applied to other products where not available as standard.

The lighting controls

For this project our 'Air Control' lighting system was utilised (<https://www.whitecroftlighting.com/products/lighting-controls/wireless/air-control/>).

Air control creates a 'mesh network' to allow BLE (Bluetooth) communication between the luminaires, movement detectors and wireless wall switches. The system is set-up through an app based (ios or android) lighting control programme. The wireless wall switches can be battery free operating off kinetic energy minimising need for wiring of system and simplification of maintenance.

The advantage of this system over a more traditional 'hardwired' addressable lighting control system is simplification of design, installation, programming and future flexibility.

[See separate drawing showing a typical layout](#) of the lighting and controls in the bedroom & ensuite areas showing a list of components. The functionality and summary for these spaces and the circulation spaces is shown below

Bedrooms

- 3 Mirage Tunable White fittings, operating on automatic circadian cycle (see above).
- 1 Air control 'hub' (ACONYCU) remote driver controlling group of 3 fittings, and 3 switch input units per room.
- 3 manual switches per bedroom as follows:
- Manual on/off & Raise/lower on room entry, for resident use.
- Manual on/off & Raise/lower next to bed head, for resident use.
- Manual 'crash' switch – override all lights on 100% in case of emergency (4000K), for staff use.
- 1 low level PIR, built into the wall next to the en-suite bathroom door. When this is triggered at night it will bring the bathroom light fittings on to 10% level for navigation.

En-suite bathrooms

- 2 Mirage tunable white fittings, operating on automatic presence detection (see above).
- 1 wireless presence detector per bathroom.
- Separate Air Control 'hub' (ACONYCU) for each en-suite so it forms a separate group to the bedroom.
- Lights are switched on to 10% when triggered from the bedroom at night (see above).
- Lights will switch on to 100% when the main PIR in the bathroom is triggered.

Circulation & Lounges

- Tunable white Mirage fittings operate on same circadian cycle as the bedrooms (see above).

- Corridors output capped at 25% during night time hours.
- All fittings connected in groups to Air control 'hubs' (ACONYCU), and manually switched from nurses bay.
- Nurses bay contains 'crash' switch to bring all lights on to 100% at any time in case of emergency.

The costs of the set-up in Parkhaven/the costs associated with tailoring a system to a care setting

The lighting control system proposed for Parkhaven was not bespoke to the care setting and has been used across multiple sectors including other healthcare, commercial, education and industrial. This highlights the flexibility of Air control as a system that it can work effectively across varying end user needs.

The tailoring of the system comes in ensuring a clear brief/scene set-up for each space is provided to ensure the correct functionality and user experience is achieved. The system also allows for simple adjustments post hand over to ensure the optimised user experience is met.

Whilst the control system can be managed and set-up by the client it is recommended that experienced commissioning engineers are used. The cost for this will vary by project and would be calculated at design stage. Comparisons against a hardwired control system, and/or a non-tunable solution available where required to support an informed decision being made.

Top tips when considering procuring circadian lighting

Investigation of the latest research on dynamic lighting should be made by the client to weigh up if appropriate for them. The research is constantly changing.

Any lighting solution (fixed colour or dynamic) must be one that balances the Visual, Biological and emotional response for residents and carers alike (also known as the VBE index).

'Human centric lighting' is more than just simply adjusting colour temperature. Colour temperature, intensity, controllability time of day and need of the application all need to be considered.

Lighting control and wiring for system need to be factored into the design.

Engage with experienced people who can support throughout the design, installation and programming stage

Clearly map out what you want the system to do and work out each scene. Often with control systems fine tuning after installation is required.