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LIGHT FANTASTIC

BUILDING SERVICES JOURNAL, JUNE 2005

South East Essex College's new building is anything but dreary - and the success of this weird and wonderful design owes a lot to the skill of its lighting designer. We report on the landmark project that has put Southend on the architectural map

By Andy Pearson

Last month the first of South East Essex College's new buildings was officially opened. The college's brief called for the 26,500 m2 building to be an exemplar higher education college for 15,000 students. It also called for the building to be a new landmark for Southend, to act as a catalyst for other regeneration projects in the region.

It was an unusual and difficult brief. The design team's solution to the challenge has been to produce a particularly innovative building, which is why a significant number of those present at the opening ceremony were the heads of other further education colleges.

The most spectacular feature of architect KSS Design Group's £35m scheme is the building's enormous atrium. This giant ETFE-clad space is the hub of the school. It is also the first impression of the college for students after they have passed through the reception.

The atrium is a bold statement by the college, outlining its intention to be an exciting, dynamic place to learn. In addition to

providing the main thoroughfare, it also houses the college's main auditorium within a bright red pod, along with a series of mushroom-shaped raised platforms that make up the students' cafe.

Getting the lighting right in this building, in the atrium in particular, has been crucial to the scheme's success. "The lighting was the key to making the scheme succeed," says Greg Byrne, project manager for Fulcrum Consulting, the project's environmental and lighting engineer.

Fulcrum 's involvement with the project goes back to 1999. However, detailed design work on the £8.1m services package did not begin until September 2002, after contractor Laing O'Rourke was appointed - on a guaranteed maximum price, design-and-build contract - and then appointed Fulcrum.

With the contractor working to a fixed price, costs were sacrosanct, as Fulcrum's lighting designer Bea Etayo explains: "Everything I came up with was too expensive," she says. As a result, everybody had to compromise a little bit to make the scheme a success. Etayo says she is "extremely proud" of the final result. And it would seem that she has a right to be: the college is pleased with the impact of its new building and in fact says that the design has worked so well that applications are up 42% this year.

Lighting the atrium

This huge ETFE-covered volume is the heart of the college. "I love this space," says Etayo. Not only is it an important meeting place but it is also used for arts and sports events. Within this space there is a forest of six giant mushrooms and what the students term "the dinosaur egg". The mushrooms are in fact curvaceous supports for dining spaces or decks for students and the giant

red egg contains a 250-seat auditorium. The northern boundary of the space is described by the stepped teaching spaces complete with their shiny silver viewing balconies and meeting areas.

Etayo says the architect did not want the lighting scheme to dominate this volume so the key question for her was "how do I get light into this space without being too obtrusive?" The solution has been to position light sources along the room's walls and use mirrors suspended high in the roof to reflect this light into the space. Two 400 W projectors are directed at each mirror. At night the two rows of 1200 mm diameter mirrored-discs, diffuse and reflect projected light down onto the floor.

Additional lighting has been added to highlight the mushroomed dining areas. "The dining decks worried me," says Etayo. She was concerned that the mirror solution, while giving enough light to allow people to move safely around the space, would not provide sufficient light for people to see to eat. So she specified five additional wide-beam spotlights, just to provide the space with an extra boost of light. In addition, low surface temperature up-lighters were recessed into the floor to accent the underside of the mushrooms.

Even though the scheme is complete, this is not the end of the Fulcrum's involvement in the space. The consultant has been asked by the college to put together an all-singing, all-dancing lighting solution for the atrium with a view to using the space for ever more ambitious events in the future.

The reception

The fully glazed reception is lit by direct and indirect suspended light fittings and halo-like recessed luminaires. Back-lit translucent boxes are located above the bright red reception

desk. Leading from the reception desk, a low-ceilinged corridor conceals the expanse of the atrium and ensures that students experience the full impact of the space.

Creating a low-energy college

For the environmental engineer the brief was clear: the client wanted a low-energy building with low maintenance requirements. In an attempt to establish precisely what the client expected from its low-energy building, Fulcrum arranged a tour around some of its completed low-energy schemes. "We took the college to see various schemes including the Elizabeth Fry building at the University of East Anglia, which is a very low-energy building based on a TermoDeck system," says Greg Bryne. The tour appears to have worked as the college subsequently commissioned the largest TermoDeck building ever built.

TermoDeck uses the thermal mass of concrete floor planks to store heat or coolth. Each concrete plank is cast with a series of hollow cores running the length of the unit; air is then ducted to these concrete cores so that as it passes along the core it can either pick up heat from, or give up heat to, the floor plank. At South East Essex College the planks measure 14.5 m long, 1.2 m wide and 0.4 m deep. Each contains four hollow cores.

The planks form the exposed concrete ceiling to the teaching spaces. The stepped blocks of classrooms are separated by a series of vertical service shafts. The shafts contain ductwork, which links the rooftop air-handling units to the TermoDeck planks. Once the air has passed through the plank's hollow core, it then enters the room.

The requirement for a low-energy design ruled out the use of mechanical cooling in the summer. Instead, the building is pre-cooled overnight using the cooler night air. This air is passed

through the hollow cores in the planks, cooling them by removing heat that has accumulated in them during the day, before being exhausted.

The system has been designed to work on "full fresh air" during the occupancy period of 8am until 10pm. Bryne says that the design was "never intended to maintain 21°C in the teaching spaces throughout the summer". He says it was accepted that occasionally temperatures in the classrooms would rise as high 27°C in the summer. However, Bryne says that this temperature will be relatively easy to tolerate and the rooms will not feel too stuffy, since this condition is only likely to occur when the system is working in full fresh air mode.

In winter, indirect fired gas heaters are used to heat the fresh air before it passes through the TermoDeck planks and into the rooms. At night, the system works on full recirculation; air is continuously cycled through the heaters and planks until the ceilings reach a temperature of 35-40°C. Then, during the day when the rooms are occupied, the system reverts to full fresh air. Incoming air is warmed as it passes through the pre-heated planks, picking up heat, on its way to the room. A heat recovery wheel ensures no heat is wasted from the exhaust air. If temperatures dip during the day, the gas heaters provide top-up heat.

On a project with a large south-facing atrium, the challenge for the services engineer is usually to come up with an energy efficient method of keeping the space cool. At Southend, the team has managed to sidestep this issue by classifying the space as an environmental "buffer zone", not an integral part of the building, exempting it from compliance with Part L of the Building Regulations.

To keep conditions in the glazed "buffer" comfortable, fritting has been used extensively on the ETFE pillows to keep out the summer sun. The amount of fritting varies, depending on the pillow location, between extremes of 90% and 30%.

Natural ventilation is used to moderate the air temperature within the space. A row of high-level lourves, situated above the teaching spaces, allows hot air to rise and escape. As it does so it draws in cooler air into the atrium through a series of low-level louvres. Dampers, controlled by temperature sensors, regulate the air movement.

The mushroom tops are the only spaces in the buffer zone that have any services. "We put in underfloor heating to take the edge of the temperature on the decks in winter," says Bryne. He says this strategy has been so successful that lectures are often held spontaneously on the decks.

Not every room in the college has such a low energy strategy. When it came to keeping conditions in the giant, red dinosaur egg comfortable, the engineer was forced to adopt a more appropriate solution. The egg contains a 250-seat auditorium, designed to be flexible enough to work as a teaching space, performance space, and conference centre for students and the public alike. In this case, to keep the audience and performers comfortable, mechanical cooling is used.

Teaching spaces

Seven floors of teaching spaces have been created from a stepped series of stacked 450 m2 column-free modules. The modules are large open-plan spaces designed to foster a new, more relaxed way of teaching by allowing up to six informal clusters of pupils and teachers to gather in each space. The design of these spaces allows the college to link several spaces or subdivide them using movable partition walls.

The 14.5 m width of teaching spaces was set by the maximum length of the concrete structural TermoDeck planks that could be delivered to site (see "Creating a low energy college", below left). Etayo says that for the lighting designer, a major benefit of using exposed thermal mass of the TermoDeck slabs is that there is no suspended ceiling, so instead the room gains an extra 300 mm in height.

The lighting for the teaching areas has been designed to be simple and efficient to operate as well as easy to maintain. It also had to allow the modules to be subdivided. The solution has been to use low-energy suspended linear fluorescent luminaires. The fittings have a 70% direct and 30% indirect component. Etayo says the open-plan rooms looked better on her computer generated models using luminaires with a higher indirect component, to reflect more light from the ceiling. She had to compromise on this, however, since the high reflective component made it more difficult to subdivide the spaces to meet the flexibility demanded by the college and achieve a lighting level of 350 lux on the working plane.

Circular downlighters have been recessed in the bulkheads that run along the open-plan areas. The electrical contractor Ellis Electrical was keen to change the wall-wash fittings for something cheaper but which Etayo felt would be less effective in illuminating the walls: "I had to fight to ensure right fittings were used," she says.

The rows of fluorescent luminaires are controlled in three blocks, each switched independently from switches adjacent to one of the three entrance doors dotted along the length of the teaching space. She says this was a "simple and robust solution". However, she is now concerned that it was a little too simple, since she says

there have been reports of lights being left on overnight.

What is ETFE?

The college's atrium is clad in ETFE pillows. This architectural wonder material of the moment is the same transparent covering used to clad the giant biomes at Cornwall's Eden Project. In fact, the college uses the second largest area of EFTE pillows in the world, after the Eden Project. The lower part of the installation can also lay claim to being the first true vertical installation of ETFE ever.

ETFE, or to give it its full name, ethyl tetra fluoro ethylene, is almost totally transparent. It also weighs significantly less than glass, so the supporting structure can be less obtrusive, and it is self cleaning - an essential attribute in a seaside town with a large seagull population. It is also very strong.

Each pillow of ETFE is formed from two sheets of the material laid on top of each other and then welded together at their edges to form a pillowcase. A small electronic pump forces air into this void to inflate the pillow and create transparent bag of air.

Silver service restaurant

One of the principal subjects taught at the college is catering. In addition to training chefs, the college is also responsible for training waiting staff, hence Ora Brasserie, the college's very own sophisticated, silver service restaurant. The restaurant is used by the staff at lunchtimes during the week and is also open to the public.

The room's relaxed atmosphere has been created using dimmable pendant luminaires, or "can fittings" as Etayo terms them, positioned above the seating areas. Circular, recessed, dimmable tungsten halogen fixtures provide an element of

contrast above the bar area.

Three oval chandeliers create a feature in the bulkhead over the banquet seating areas. These have been built by Cube Lighting and have a mirrored base incorporating dimmable halogen capsules to illuminate a series of icicle-like hanging transparent rods.

All the restaurant's dimmable lamps have been set to four pre-programmed settings to keep the operation simple.

Students' cafe
The lighting in the student's cafe "Scoff" is designed to look funky. The cafe has tables inside and outside in the atrium on the dinning platforms. To give the room "a sense of fun", Etayo has used ice blue-coloured linear fluorescent luminaires arranged in random positions and suspended at various angles and heights. She has contrasted the cool blue lamps with warm-coloured recessed downlighters over the servery counters to ensure the food looks appealing.

Project team
Client South East Essex College
Developer Equion
Architect and Interior designer and college branding KSS Design Group
Environmental engineering Fulcrum Consulting
Structural engineer Adams Kara Taylor
Contractor Laing O'Rourke

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