

# CASE STUDY - PINES CALYX , NR DOVER, KENT, ENGLAND



*Project statistics: Appointment September 2004 – completion October 2006 Client: St Margaret’s Bay Trust/Pines Calyx  
Concept Architect: Issy Benjamin; Design: Helionix Design/Conker Conservation/Ecolibrium Contractors/Lighting Design House;  
Lighting Design Input: Healthy lighting strategy/Concept development, Daylight & artificial light modelling, tender drawings,  
product design, controls design and commissioning. Total Build cost: £650,000; Lighting Equipment: £20,000 Controls:£6,500*

## Introduction

The inspired brief from Alistair Gould, client & director of Helionix Designs, for the lighting was extremely unusual; to design an environment that was to be beautiful, ecologically sound AND as physiologically beneficial as possible. This last goal influenced every decision made and the end result is a unique environment that can change at the wiggle of a virtual slider from a business-like comfortably lit white light environment to a moody sexy space lit with different shades of coloured light .



## Healthy Lighting Strategy:

### 1. Electricity.

Although there is limited evidence that electromagnetic fields really have a detrimental affect on our bodies because we were introducing electricity into a previously untouched environment we wanted to take as many precautions as possible to reduce any risk, however small. We knew that people would occupy the spaces for several hours at a time when they were involved in workshops and conferences and also that the space would be used for the types of exercise class where they would sit or lie down on the floor. So we worked with the contractor and services consultant to plan the wiring so that no cable routes ran across the floor, all cable routes were run around the walls,

and various design details such as pelmets and half height walls were developed to allow this to happen.



*The pelmet above conceals cables as well as provides the perfect mounting location for wall washing*

We also planned to have the option of one set of lights on a direct current rather than the standard alternating current. This is because there is limited evidence that if electricity is bad for you then DC electricity has far less impact on our bodies, if any at all. So we set up one circuit in each of the main rooms that would give a low level of light – maybe for meditation or relaxing – and be run on DC.



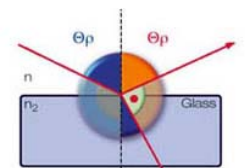
*The half wall above conceals cables as well as provides the perfect mounting location for linear amber LEDs that are run on Direct Current – a gentle effect akin to candlelight*



## 2. Control of Glare

The technical advances in light source design have been driven by the desire to create smaller brighter units that last a very long time. The disadvantage of this is that the amount of light in almost every energy efficient light source is much more than previously, according to its' physical size. This has led to many environments being lit with fittings that are too bright to the eye.

Numerous guidelines point to glare as being the number one complaint against light of most users of buildings. The lighting techniques in the Calyx are practically glare free. In the main building circulation spaces indirect light within coffers is used. In the two key areas, we used a special polarizing diffuser which can be viewed directly by the eye without causing any glare – this particular diffuser also improves contrast and can improve visual acuity.



up to more than 95% polarization of the emitted spectrum



The polarizing diffuser from Clearvision distributes glare free light of varying colours of white light and actual coloured light if required.

## 3. Use of Coloured light to create shades of white & colour

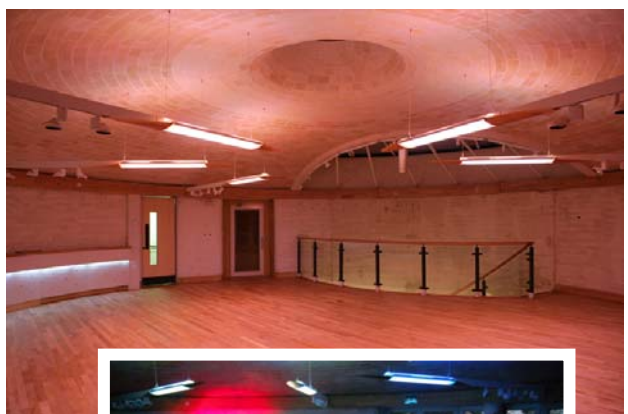
The recent discovery of a non visual receptor in the eye <sup>1,2</sup> that affects the hormone release, especially for those hormones that control the body clock, melatonin etc has led to a flurry of research into the creation of environments that are not only visually pleasing but also stimulating to this non visual receptor.

This is all with the aim of making people more productive not necessarily more comfortable! Very low levels of monochromatic blue light over a relatively short period of time has been found (by some, Brainard et al, LRC, New York) to be the most effective stimulus. Very high colour temperatures up to 17000K in combination with bright light of 2000 lux or more have been found by others (Philips lighting) to be more effective. This is not conclusive, recent research by Professor Debra Skene, Centre for Chronobiology, University of Surrey <sup>3</sup> undertaken in a care home environment appears to indicate that green light could provide a better stimulus.

Our scheme allows for a short period of time to light the space with pure coloured light, blue or green, as a “wake-up call” to the people in the office or amenity space, perhaps at mid afternoon. The pure blue light could also be combined with the 6000K white light to generally raise the colour temperature of

the light within the space, which should also have a stimulating effect.

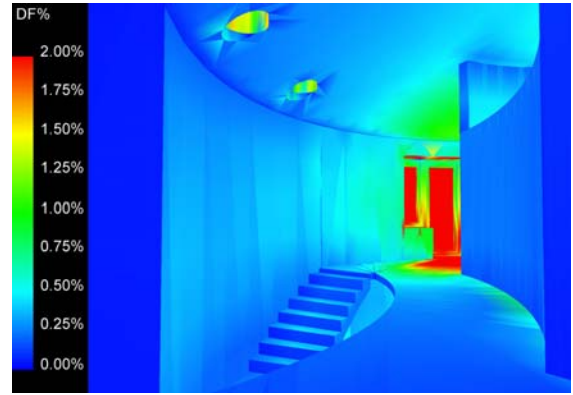
This is achieved by dimming the 3 tubes within the suspended fluorescent fittings - which are red, green and blue – in different percentages so that a variety of whites ranging from cool to warm can be used as well as actual coloured light if desired.



#### 4. Daylight design

It is vital that buildings are designed in such a way as to maximise daylight use, so that there will be less need for artificial light and therefore less energy will be consumed. Maximizing the daylight ingress also keeps the buildings' users in touch with the outside world and this has been proven to improve mood, productivity and physical well being.

After extensive 3D modelling using our lighting calculation program AGI32 we persuaded the client to increase the size of the roof light in the office space, taper the sides and added a large roof light over the staircase.



The original design for the staircase was 3 "sunpipes". The modelling showed daylight factors of less than 2% using this technique - even on the top of the stair - and at the base it was zero. A larger opening was modelled and the design was changed.



Original scheme – daylight factor = zero.

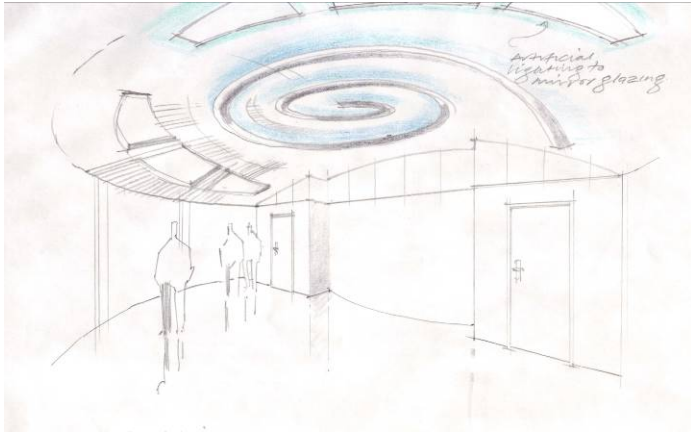
Skylight scheme – daylight factor 10%

Final scheme – the reception & stair area is the heart of the project, a great place to chat.



## Design Concept Development

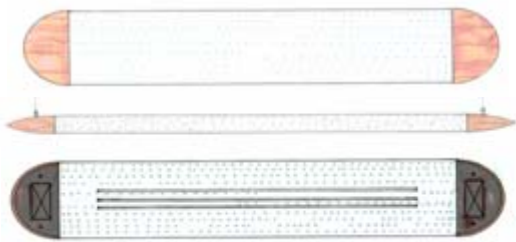
It was a chance mention by the concept architect, Issy Benjamin, that we should consider the Fibonacci spiral as a starting point for design development that eventually led to the development of the suspended fittings that ticked all the boxes for energy efficiency, light quality and variability needed



Original concept = Suspended Spiral shape

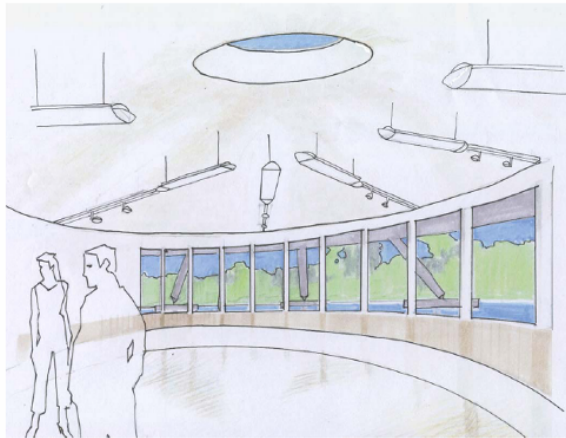


Final scheme = suspended indirect/direct fittings



## Design development of special fitting

Visual to show special fitting and trunking in situ



Special fitting using red green and blue fluorescents which can be mixed to produce a range of colours including whites



## Prototyping and final production by Clearvision



1. Thapan K, Arendt J, Skene DJ. An action spectrum for melatonin suppression: evidence for a novel non-rod, non-cone photoreceptor system in humans. *Journal of Physiology* 2001;535(1):261-7
2. Brainard GC, Hanifin JP, Greeson JM, Byrne B, Glickman G, Gerner E, Rollag MD. Action spectrum for melatonin regulation in humans: evidence for a novel circadian photoreceptor. *Journal of Neuroscience* 2001; 21:6405-12
3. Verbatim, Skene DJ, ILE Light & Health Conference March 2009