

A detailed architectural wireframe drawing of the Leadenhall Building, showing its complex steel structure and unique tapered profile. The drawing is rendered in a dark color against a light background.

HUMAN CENTRIC LIGHTING AT THE LEADENHALL BUILDING

Spectral[®]

“It is essential to have a close working relationship with a lighting manufacturer who shares your vision and has the depth of knowledge and ability to innovate that’ll allow the idea to evolve; we were fortunate to find this in Spectral.”

Maurice Brennan
Head Architect, RSHP



Daylight 6500°k



Warm 3000°k



Neutral 4000°k



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Scan this QR code to find out more
about the Leadenhall project.



THE SCIENTIST'S VIEW

Truly Human Centric Lighting,
a preface by

Professor Russell Foster

CBE, FRSB, FMedSci, FRS

Director at

**Sleep & Circadian
Neuroscience Institute**

Fellow at

**Brasenose College,
University of Oxford**



Until the late 1990's it seemed inconceivable to most vision biologists and ophthalmologists that there could be an unrecognised class of photoreceptor within the eye. After all, the eye was the best understood part of the central nervous system.

One hundred and fifty years of research had explained how we see: Photons are detected by the rods and cones and their graded potentials are assembled into an image by inner retinal neurones, followed by advanced visual processing in the brain. This representation of the eye left no room for an additional class of ocular photoreceptor. However, we now know that the rods and cones are not the only photoreceptors. We discovered that the eye contains a "third" class of photoreceptor, based upon a small number of photosensitive retinal ganglion cells (pRGCs). These amazing blue-light sensitive cells detect environmental brightness (irradiance) and regulate a wide range of physiology and behaviour including the regulation of 24h body clocks (circadian rhythms), sleep timing, alertness, mood and even pupil size. This finding has transformed our understanding of how the eye detects light and has led to a whole new and exciting area of sensory biology.

There are also important clinical implications, not least for the classification of blindness. Ophthalmologists now appreciate that eye loss plunges individuals into a world that lacks both vision and a proper sense of time, and the assessment, treatment and care of individuals with eye disease must take these dual functions of the eye into account. A similar responsibility exists for the lighting industry and the architects who design the artificial lighting for our living spaces.

Human centric lighting (HCL) has been about producing a light fitting with tunable white LEDs that produce low level warm to bright white light. More recently HCL has taken into account the special properties of the pRGCs which are known to be relatively insensitive and respond maximally to bright long-duration blue enriched light. So “circadian lighting” or “alertness lighting” has incorporated these broad lighting features.

All seemed well. However, we now appreciate that the rods and cones are connected to the pRGC and can variably contribute to the responses of these cells. As a result the pRGCs, and hence the responses they mediate, can respond across a broader wavelength range than originally envisaged. Furthermore, multiple features of the light environment are integrated by the pRGCs.

Gradual changes in both the level and spectral quality of light over time seem important; the time of day of the

light exposure can be critical; the direction of light may be important in some circumstances; and it seems our circadian, sleep and alerting systems respond differently to light as we age! So we are currently in the frustrating position of knowing that pRGC responses to light are different from the rods and cones, but lack the evidence-based studies to define with precision the type of artificial light that is most appropriate for the different spaces we inhabit. We do not know in any real detail the most appropriate lighting to reduce alertness before bedtime or maximise alertness in the workplace. In the same way, we do not really know what lighting to provide in the home, factory, hospital, intensive care unit, office or school to ensure that the circadian and sleep systems are appropriately regulated.

Perhaps the time is now right for biologists, lighting engineers and architects to work together to generate these data for the development of truly human centric lighting.

THE BRIEF



In December 2015 Rogers Stirk Harbour + Partners moved into level 14 of the Leadenhall Building, which the practice itself designed.

RSHP gave careful thought to how to light their offices, and opted for a human centric system that changes colour and intensity in accordance with outside conditions, throughout the day. To deliver this innovative tunable lighting method, RSHP's lighting consultant Speirs + Major selected Iris, designed by Spectral.

The Architect's moving in date meant that Spectral only had nine weeks to develop and deliver the bespoke product to site.

Now fully installed, Maurice Brennan describes how RSHP staff have embraced the new lighting system: 'We have had very positive feedback on the lighting of the studio'. It's also been welcomed by visitors. According to RSHP partner John McElgunn, 'Clients love coming here. It's definitely more vibrant – there's a bit more of a hubbub.'

THE ARCHITECT'S VIEW

Q&A with
Maurice Brennan

Head Architect at
**Rogers Stirk Harbour
+ Partners**



Maurice Brennan, project architect of RSHP's office, discusses the importance of collaboration, throwing out the lighting rulebook and his colleagues' response to the tunable lighting.

This is an unusual design in a very traditional commercial centre. Did you ever feel constrained by conventional lighting designs for traditional office space (like on other floors in the same building even)?

No. Our intention from the outset was to avoid using a traditional suspended ceiling, and to expose the services and maximise the ceiling height as much as possible. To suspend light fittings from the ceiling would have added to the visual clutter, so we were advised by the design team that track mounting the light fittings would be a neat solution and significantly reduce the amount of cabling to power and control the lights. This is the only floor in the building to use this strategy.

How have your staff interacted with the tunability of the lighting? Usually people like to override to cool in summer and warm in winter. Has this happened?

The response has been interesting. Without question there have been those who favour warm over cool white, and we have had comments on the lighting levels – some prefer brighter light than others, for example. There has been a



learning curve where staff have grown to understand the methodology behind why the white light changes over the course of the day. Some have accepted it wholesale, but the jury's out for others. It has undoubtedly put into question the control aspect and the importance of how the control system is programmed. But overall we have had very positive feedback on the lighting of the studio.

Would you consider this approach to lighting future buildings, having lived with it yourselves?

Absolutely. Careful consultation with professional bodies is essential to its success, however. The control design was administered by Speirs + Major who brought a wealth of knowledge that was invaluable. It is essential to have a close working relationship with a lighting manufacturer who shares your vision, and who has the depth of knowledge and ability to innovate that will allow the idea to evolve; we were fortunate to find this in Spectral. To expect a control company alone to set up the tunable white programming would be short-sighted. To humanise the lighting by avoiding a set light level throughout the work space seems logical.

Was it your intention to opt for an unconventional way of lighting RSHP's new office?

We have a history of exploring the interesting integration of services into our building designs, and the opportunity to design our own studio allowed us to enjoy this exploratory

freedom. Lighting was a key defining element so was carefully considered early in the process. Consultation with a huge wealth of engineering and lighting knowledge gave us confidence to design a low-profile yet signature lighting design.

Do you feel lighting regulation constrains the lit workplace?

Workplaces are becoming more dynamic. This, coupled with the wholesale adoption of LED lighting, has meant more reliance on the regulations than ever, but to architects some of the regulations are either very constraining or very confusing. We have just got to grips with the traditional light sources such as fluorescent, but have now had to re-educate ourselves on how LED lighting compares to the 'old' lamps. Energy-efficiency constraints can sometimes work against us; the use of indirect light, for example, is good for the working environment, but not so good for efficiency.

How important was it to have the expertise of a lighting designer on the project?

Essential.

Do you feel the control of the lighting is as important as the light product itself?

Yes, although I might not have said that when we started the project. We have come to realise that it is integral to the function and success of the human aspect of the lighting scheme.



THE LIGHTING DESIGNER'S VIEW

Notes from
Iain Ruxton

Associate at
Speirs + Major



Iain Ruxton of long-time RSHP collaborator Speirs + Major reveals how they tuned the lighting to a circadian cycle.

Rogers Stirk Harbour + Partners' office move represented an innovation for all involved – a City tower is not a typical home for a leading architectural practice.

Having moved right into the heart of its own portfolio – the Leadenhall Building, with its great view of the iconic Lloyd's Building opposite, they set out to make a definitively creative studio space within the spec office floorplate.

The intelligent use of various aspects of technology was key to achieving this.

As long-term collaborators on a variety of projects, Speirs + Major were asked to assist RHSP in developing the lighting approach, which included exploring the use of colour-temperature tunable white light in the studio, with the aim of adding a level of physical and psychological comfort to a space where the team often works long hours.

The facility to mimic (or to deliberately differ from) the natural circadian cycle of colour temperature is a hot topic in lighting, so the chance to try it out in a fast-turnaround project, with innovative architects as clients, was a great opportunity.

The initial programming of the control system delivers an

approximation of the natural circadian cycle, changing slowly from warm in the early morning to cool through most of the day to facilitate concentration, and warming up again in the late afternoon, providing visual comfort as natural light fades and the office moves into an evening working mode.

The intention is to monitor how the team finds the lighting, and to adjust the behaviour of the system and experiment with different cycles if necessary.





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Iain Ruxton
Speirs + Major

THE MANUFACTURER'S VIEW

Meeting the technical
challenges by
Jon Estell

UK Head of Design at
Spectral Lighting



“It was a pleasure to work in such a closely focused demanding design team. The enormous level of experience in the team, with very clear objectives and understanding of each other’s roles, helped us achieve an incredibly short delivery time. We are very proud of the installation.”

Jon Estell, Head of Design at Spectral Lighting.

The architects moving in date meant that Spectral only had nine weeks to develop the fitting and deliver to site. Each fitting would be linked to a DALI control system which responds to daylight intensity. Incredibly, each IRIS fitting consumes only 25 watts. Its lumen and power efficiency are exceptional.

Tell us about human centric lighting.

Human centric lighting (HCL) is fast becoming a buzzword for any lighting product or design that uses a ‘tunable white’ light source. LED technology has enabled us to control a broad range of colour temperatures from very warm white light to daylight white light (sometimes referred to as ‘tunable white’). It is not new to the world of lighting but is now much more attainable, hence its greater prominence recently.

But is it just a marketing term – what does it actually mean?

The ‘human’ aspect of the term is the most important. Lighting (particularly artificial lighting) is, or should be, about humans

and how we operate in a space, be it a hotel, workplace, home, factory, etc. As humans we should be the focus of any lighting design. So the human centric lighting term perhaps makes sense!

So what is human centric lighting?

Much has been talked about the benefits of artificial lighting mirror imaging our body clocks. We humans are attuned to how daylight works – it rises in the morning and goes down at night and we then sleep whilst it's dark. Just like daylight, circadian rhythm is about intensity, colour, position, softness, direction and texture. It's what shapes our world. To create internal lighting that mirror images this is an exciting prospect. However, there are some misconceptions; human centric lighting is not simply about producing a light fitting with tunable white LED's to enable the user to control between warm and daylight colour white light. There is much medical evidence and research to prove the benefits of different white lights – certainly true of the blue end of the spectrum for alertness, for example.

Is HCL only possible with LEDs?

No. In fact HCL has been around for over 10 years, it's just that LEDs make the control of the colour of white light and its level much simpler and more attainable. LEDs also come in a very broad range of colour temperatures which make it much easier to integrate into a luminaire.

How important are light levels?

In the workplace they are particularly important. The indoor office environment has a fraction of the light levels (illuminance measured in Lux) outside. Generally light outside has a range from circa 3,000 Lux (most dull English days!) to 10,000-plus in direct sunlight (once a year if you are lucky!). UK CIBSE lighting guides recommend between 350-500 Lux (500 being the industry standard) for a workplace. Energy consumption is often at the heart of trying to achieve the minimum requirement which could be argued as not very 'human centric'!

Any do's and don'ts?

One important consideration when light planning is the scale of the space – open-plan workplaces offer a larger field of vision to a human than a segregated office room, for example. You cannot achieve good circadian efficiency with accent lighting. Indirect lighting should be considered as part of the field of vision process. The other is the direction that the light is going and what surface it will hit. Indirect light or ambient light (the upper half of the room) has a positive biological effect in the lower half because it's comparable to cold white light from outdoors; it actually enters the lower part of the retina where the most ganglion cells are found. When the sun sets, to have indirect cold white light would be inappropriate as it's not what happens outside.

THE PRODUCT

Spectral Iris technical details

Spectral Iris is available in 10 colours and can be either suspended or ceiling-mounted.

TECHNICAL DATA

Power 25w

Cri 85+

Colour range 3000k - 6500k

- 830: 3780lm (ca. 25W) 100% 830 - 0% 865
- 840: 3870lm (ca. 25W) circa 71% 830 - 29% 865
- 865: 3960lm (ca. 25W) 0% 830 - 100% 865

IP rating IP20

Body Super clear ABS (Acrylnitril-Butadien-Styrol)

Finish Transparent

Control DALI Dimmable

Power supply Integral DALI Dimmable

Dimensions Iris 363mm diameter x 59mm height / dish 750mm diameter



Product highlights:

- IRIS transparent housing emanates light from within.
- Radial micro prism lens used in place of a traditional louvre.
- Tunable white light can be controlled via a timed control system or overridden using touch panel control.
- Lighting design exceeds the latest office lighting standards.
- Exceptionally low power consumption - each fitting is only 25 watts!
- Track mounted using data bus track for power and control.
- Track adapter connectivity made for significantly reduced installation time.
- Tunable white LED Alucore Printed Circuit board designed and manufactured in house represents excellent electronic heat management.
- Integrated miniature emergency module into central colour coded disc
- Very shallow 750mm diameter aluminium dish reflects indirect light. Primarily used suspended on near-invisible three way-split power cables, Iris can also be wall or ceiling-mounted.

Every detail of the design is echoed consistently. From the ring shaped electronic ballast in a transparent housing to the pendant fixings without any separately visible mains leads. The luminaire is left to perform the perfect solo, unadulterated by any disturbing elements.

The diffuser is formed from a single sheet of ultra transparent material. The crisp radial prisms control and direct the light preventing glare but allowing the nature of the LED light source behind to be subtly revealed.

The sides of the luminaire provide another intriguing glimpse of the LED light source.

Typically hidden from view behind an opaque reflector, in the case of Iris though, a semi transparent reflector created from evaporated aluminium provides visual interest and high efficiency.



Spectral[®]

Bend the rules.

Spectral Lighting
8/9 The Marshgate Centre, Parkway,
Essex CM19 5QP United Kingdom
Tel. +44 (0) 1279 450882
Email. enquiries@spectral-lighting.co.uk
Visit. www.spectral-lighting.co.uk

RIDI GROUP