

Paul Stearman – Greenlight Connexions



Lighting Training Presentation

This document summarises Paul Stearman's two-day lighting training presentation, covering core technical themes, practical design topics and compliance considerations. Day 1 focuses on lighting history, visual perception, measurement, colour quality and LED technology; Day 2 covers applied design, energy performance, daylight, controls, regulations, sustainability and emergency lighting.

- The presentation is structured as a practical lighting education programme, divided into two days and progressing from technical foundations to applied design and compliance topics.
- Day 1 addresses the evolution of lighting technologies, human visual perception, methods of light measurement, and the design, manufacture, powering, and optical control of LED systems.
- Day 2 builds on this foundation by examining energy efficiency, daylighting, luminaire construction, lighting controls, calculation methods, standards and regulations, sustainability, and emergency lighting.
- The presentation targets learners seeking both conceptual understanding and practical terminology for discussing lighting performance, product specifications, and building compliance.
- Overall, the content offers a comprehensive introduction to modern lighting, integrating historical context, human factors, measurement science, LED technology, and design responsibilities.

Day 1: Foundations of Lighting and LED Technology

History and Development of Lighting

- The presentation begins by tracing the history of lighting, illustrating how successive technologies have influenced modern lighting performance, efficiency, and application choices.
- Earlier light sources, such as oil, gas, arc, discharge, fluorescent, filament, and halogen lighting, are discussed to provide context for comparing differences in performance, efficiency, maintenance, and applications.
- The history of LED lighting is presented as a pivotal transition, demonstrating how solid-state lighting has become integral to contemporary lighting design and product development.
- This historical context clarifies why LED systems now predominate in commercial, residential, and architectural lighting applications.

Human Vision, Perception and Wellbeing

- A dedicated section on human vision explains how individuals perceive and respond to light, which is essential for effective lighting design.
- The presentation highlights visual adaptation, emphasising that perceived brightness and comfort depend on environmental context, ambient light levels, and the eye's adjustment over time.
- Colour perception is covered to help learners understand why different light sources can make the same object or space appear different.
- Circadian effects are addressed, indicating that lighting influences not only visual perception but also biological rhythms and overall human well-being.
- This section connects lighting science to user experience, underscoring the importance of comfort, health, usability, and visual quality.

Light Measurement and Photometric Data

- The light measurement section introduces the equipment and data used to quantify lighting performance.
- Integrating spheres are introduced as instruments for measuring total light output, facilitating understanding of lumen output and product testing.

- Goniophotometers are instruments used to measure light distribution, clarifying how luminaires project light within a space.
- The presentation refers to photometric data files in the .IES and .LDT formats, which are commonly used in lighting calculation and design software.
- This content prepares learners to interpret manufacturer data sheets and to understand how measured performance informs design decisions.

Colour Quality and Appearance

- The presentation explains colour temperature and correlated colour temperature, enabling learners to distinguish between warmer and cooler light characteristics.
- Colour rendering is covered through references to the Colour Rendering Index and TM-30, introducing methods for assessing how accurately or naturally light reveals colours.
- This section is particularly relevant for applications in which colour quality influences comfort, product appearance, safety, retail presentation, or visual judgement.
- The material connects technical metrics to practical specification decisions, such as selecting suitable colour temperature and rendering quality for specific environments.

LED Lighting, Optics, Glare and Powering

- The LED lighting section explains how LED products are manufactured and how different LED types are used within luminaires.
- LED optics are covered to show how lenses, reflectors and other optical components shape beams and control distribution.
- Glare is addressed as a critical design consideration, emphasising that efficient or bright lighting does not necessarily ensure comfort or suitability.
- The presentation also addresses LED lighting power and flicker, which are essential topics for performance, reliability, visual comfort, and product selection.
- Collectively, these topics provide learners with a comprehensive understanding of LED system operation, specification, and associated design risks.

Day 2: Applied Lighting Design, Efficiency and Compliance

Energy Efficiency, Efficacy and Daylight

- Day 2 begins with a focus on energy efficiency and efficacy, clarifying the relationship between light output, energy consumption, and overall system performance.
- Daylight is presented as a significant design resource, with emphasis on its effective integration alongside electric lighting.
- The presentation includes a daylight factor calculation, giving learners a practical method for assessing daylight availability in a space.
- The use of daylight and sunlight is positioned within a holistic lighting design strategy, supporting energy reduction and enhancing occupant experience.
- This section encourages consideration of lighting strategies at the whole-building level, rather than focusing solely on individual luminaires.

Luminaires, Standards and Product Testing

- The luminaire section addresses construction and manufacturing processes, enabling learners to understand the physical design and assembly of lighting products.
- Standards and testing are discussed, with references to BS, EN, IP, and IK requirements, indicating that product performance must be evaluated against established technical and safety criteria.
- IP ratings are relevant to ingress protection, while IK ratings relate to impact resistance; both affect suitability for different environments.
- This section helps learners connect product design, test evidence, and specification decisions.
- The fire rating is addressed later in the Day 2 agenda, reinforcing the importance of safety and compliance in lighting product selection.

Lighting Controls, Energy Rating and Labelling

- Lighting controls are identified as major contributors to energy savings, usability, and operational flexibility.
- The inclusion of energy rating and labelling demonstrates how product efficiency is communicated, compared, and considered during specification.

- Controls may be integrated with daylight availability, occupancy patterns, and building operations to achieve more efficient lighting outcomes.
- This section bridges technical product knowledge with practical decision-making regarding post-installation lighting management.

Lighting Calculations and Design Language

- The presentation introduces the lumen method calculation as a foundational approach for estimating required lighting levels within a space.
- Lighting units and terminology are addressed to ensure learners can accurately interpret specifications and communicate with clients, designers, and manufacturers.
- Lighting calculation from photometric data sheets is included, linking Day 1 measurement content to practical design work.
- Maintenance and Utilisation factors are emphasised, demonstrating that lighting design must account for light loss over time and the effectiveness of light delivery to the working plane.
- These calculation topics enhance understanding of how to develop, verify, and justify lighting proposals.

Regulations, Sustainability and Emergency Lighting

- Part L of the Building Regulations is included, demonstrating that the presentation addresses legal and performance requirements for energy conservation in buildings.
- LENI calculation is listed as a topic that supports the understanding of lighting energy performance at the building or space level.
- Sustainability is presented as a dedicated theme that connects efficient product selection, daylight Utilisation, controls, regulatory compliance, and long-term environmental performance.
- Emergency lighting is covered as a specialist area where safety, compliance and reliability are critical.
- The inclusion of fire rating further underscores the presentation's emphasis on responsible specification and safe installation practices.
- The presentation offers a comprehensive, structured introduction to lighting, beginning with historical technologies and concluding with contemporary design, regulatory, and sustainability considerations.
- It integrates science-based topics, including human vision, colour perception, and photometric measurement, with practical subjects such as luminaire construction, controls, and calculation methods.

- LED lighting is presented as a central technology, with emphasis on manufacturing processes, types, optics, glare, powering, and flicker.
- The programme aims to build confidence in interpreting lighting data, understanding product specifications, and applying lighting terminology accurately.
- By addressing daylight, controls, Part L, LENI, and sustainability, the presentation situates lighting within the broader context of building performance and environmental responsibility.
- Safety and compliance are recurring themes, particularly through discussions of standards, testing, IP and IK ratings, fire rating, and emergency lighting.

Learning Outcomes

- The presentation is relevant for lighting sales teams, specification teams, junior designers, facilities professionals, architects, engineers, and others seeking a comprehensive introduction to lighting principles.
- Upon completion of the two-day programme, learners should be able to discuss lighting technologies, interpret light measurement data, and understand core performance terminology.
- Learners are also expected to gain awareness of how to evaluate LED products, consider glare and flicker, and understand the significance of colour quality.
- On the applied side, participants will be introduced to lighting calculations, daylight assessment, energy performance indicators, and the role of controls.
- The programme is designed to help learners identify how regulations, standards, safety requirements, and sustainability goals influence lighting design and product selection.

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