Lighting Design Techniques for **Retail Shops**

NELCA ROCO LIGHTING DESIGN

Book

1

NELCA ROCO ALL ABOUT LIGHTING DESIGN

Lighting Design Techniques for **Retail Shops**

NELCA ROCO LIGHTING DESIGN

Lighting Design Techniques for Retail Shops

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Preface

Hello, fellow lighting designers! Thank you for reading this e-book. This book is a not-so-formal source of reference material written as if I am talking to you in person.
Our main goal for writing this book is to share our knowledge for free. Our mission is to support the borderless-information-world. We would like to see a world where we all have access to all the information we need through the internet and no one is left behind. Really idealistic, but there is no harm in dreaming big. A little caution though; no matter how much information we get, if we do not use it, it will be useless. Like my mentor usually says, “Knowledge is not power until you use it”.

If you have comments or suggestions, please let us know by sending us an e-mail to nelca.roco@nrocolightingdesign.com, or join our Facebook group Dialux Users. Also, check our Youtube channel for more video tutorials www.youtube.com/user/nelcaroco/videos
There is a series of video tutorials included in this e-book, this icon  will show you where to find them.

To help us improve and become part of our e-books series, please send your **Book Review**, **Book Critique**, **Sample Calculations** or **Images** to nelca.roco@nrocolightingdesign.com.

You may also send us your own Lighting Design Techniques; we may even include them in one of the chapters.

This book is dedicated mostly to Lighting Designers.

Thank you and I hope you like it. Enjoy reading!

Don’t forget to apply it.

Upcoming Books:

RETAIL LIGHTING BOOKS

BOOK 1: Lighting for Retail Shops

BOOK 2: Lighting for Supermarkets

BOOK 3: Lighting for Car Showrooms

BOOK 4: Lighting for Jewelry Shops

OFFICE LIGHTING BOOKS

BOOK 1: Lighting for Small Offices

BOOK 2: LEED Certified Office Lighting Design

BOOK 3: Offices with Artificial and Daylight Integration

BOOK 4: Control Centre Lighting Design

INDUSTRIAL LIGHTING BOOKS

BOOK 1: Substation Lighting Design

BOOK 2: Seaport Yard Lighting Design

BOOK 3: Airport Hangar Lighting Design

BOOK 4: Warehouse Lighting Design

SPORTS LIGHTING BOOKS

BOOK 1: Football Field Sports Lighting Design

BOOK 2: Swimming Pool Indoor Lighting Design

BOOK 3: Sports Hall Lighting Design

BOOK 4: Golf Course Lighting Design

LANDSCAPE LIGHTING BOOK

FAÇADE LIGHTING BOOK

ROAD LIGHTING BOOK

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Chapter 1

Introduction

Architecture is the learned game, correct and magnificent, of forms assembled in the light. –Le Corbusier

Retail Lighting Design. Shopping, lighting, track lights, spotlights, window displays, branding – these are the words you will always hear from me. Are you familiar with these words? If so, then we are on the same wavelength which means we can talk more about our topic today! Are you excited now for our first ever lighting design tutorial in e-book? Wait, not just an e-book, but also video tutorials! Let me remind you that this e-book is not yet official reference material. Please correct me if you find errors and misleading information.

I will discuss the tutorial in this e-book the same way I do in my YouTube tutorials, if you think my way of writing can be improved, please don't be shy to let me know. I am very excited about writing this e-book and I might slip my hobby in talking much even in writing. Hahaha! Let me know your opinions.

So, let's get started!

What are Retail Projects?

You might be wondering what retail projects are. If your boss or your client asks you to design a retail shop, you might immediately think of a clothing store. Actually, that might be for me only. I really don't know if you think the same.

Retail projects go from small to big enterprises. Malls, supermarkets, clothing boutiques, grocery stores, car showrooms, book shops, toy shops, bakeries, and jewelry shops, anything that sells merchandise in a specific place can be a retail project.

Now, we know.

To get the perfect definition of retail projects, let's go and visit this website: Types of Retail Outlets.

Since there are a lot of different retail projects, this e-book will only focus on clothing retail shops.

History of Retail Shops

Let's go back to where retail shops began; it is better for us to understand the history of the project we are working with. When, where, why, who and how did these retail shops start? I first heard the words "retail shop" when shopping malls already existed. How about you?

I only know that we started from a barter system, when there was a common public place where people could sell goods, then came money, and people could buy more; then people asked for more, and people can do a lot more; then men and women started to become obsessed with fashion, and then retail shops with lighting started.

On his blog, Josh will tell us how we got here (a short history of retail), and Nicole will give us hints about the history of retail shopping. If you are really interested in how retail shops started, then, read this list of books and articles about history of retailing. Hahaha! Let me know if you did read all of these. I will give you some amazing gift!

Please note: to get the most from this e-book, you may click on the images and it will direct you to the website link. Most of the images here are from the internet. You may then read the articles, blogs, and other information later on. This is my way of referencing the images. Wink!

Major trends and enablers have driven new eras within US retailing

	From 1900…	… to 1940	1940 to 1970	1970 to 1990	1990 to 2008	2010 -2015+
						?
	• Local corner stores	• Self-service model • Department stores • General merchants	• Enclosed malls • Strip centers • Mass retailers	• Value players • Club stores • Category killers	• E-commerce • "Retailtainment" • Big box and discount expansion	

…Driven by changes in the three core retail building blocks

Merchandise and pricing	• Standard products • Refrigeration	• Mass market products • Demand for variety	• Commoditization • Private brand • Oil crises	• New definition of value • Mass customization
Store experience	• Shopping cart • Self-service	• Suburban life • Automobile	• One-stop shopping	• Services • Online/virtual
Marketing approach	• Print media • Radio ads	• TV ads • Fads & fashion	• Global megabrands • EDLP	• Introduction of personalization online

McKinsey & Company | 0

Functions of lighting in retail shops

So, before we go directly to our computer and start clicking the Dialux icon or any lighting design software icon for that matter, let us find out first what are we going to do and why retail shops needs lighting.

Why do you think retail shops need lighting? How do you think lighting will help a retail shop reach its goals? What are the goals of retail shops? These are some of the questions that we need to discuss before diving in.

According to business experts, a retail shop's main objective is to sell merchandise. Nothing else! That's the end goal.

Ok? So that is the main goal. Sell goods. How do you think lighting will help that?

To reach that end goal, there is a process called "attracts then satisfies". From attracting customers to enter the shop, to sensing the products in their hands, to completing the sale at the cash counter, lighting will absolutely help a lot!

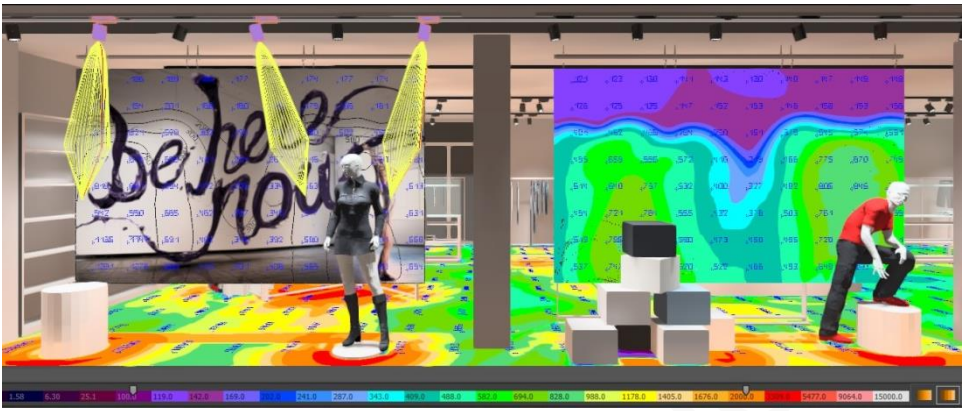
The basic functions of Retail Lighting are to:

1. Attract customers
2. Guide customers
3. Show-off the merchandise
4. Provide task light

…and so on. There are lots of articles mentioning the basic function or roles of lighting in retail shops. Let's just focus on these four.

Attract customers

This can be done from the entrance, the window display, and highlighted items. Lighting is the most powerful tool to attract the attention of people. You might think it's the color, or the shape, or the movement. But no, it is the light. It is the secret ingredient to enhance the colors, the shape and even the movement. Light is the hidden hero for all the beautiful things you see in this world. (That is for the tangible ones anyway.)



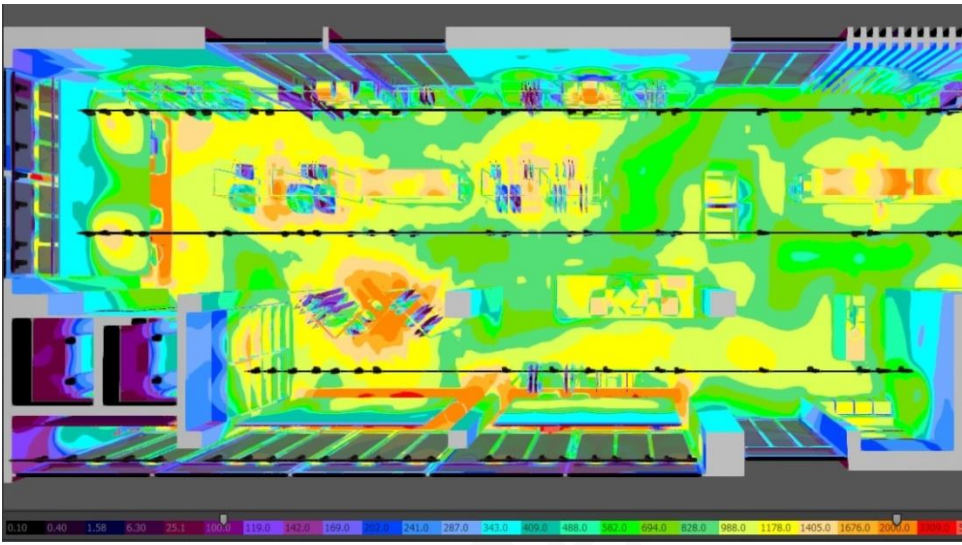
Entrance and window displays are the main areas that are critical for making that important first impression of a retail shop. The lighting design must convey the correct message about what is inside the shop. It must complement the architectural features of the shop entrance, and provide the best lighting scene for different occasions.

Later in this chapter, we will discuss how to light the window display and entrance effectively. There are many ways to do this. Window displays are usually associated with different events, which means, installing with different lighting effects. The retailer wants a flexible lighting installation, so we, as lighting designers must help them accomplish it.

Guide customers

Lighting must successfully guide customers to properly circulate inside the retail store. Finding the locations of fitting rooms and cash counter inside the shop must be easy for customers.

This safety and guidance will usually be achieved by general lighting. Special lighted signage for fitting rooms and cash counter will add emphasis to these areas.



For this particular function, lighting standard must prevail, 300 lux for general lighting. Guiding customers requires lighting uniformity or better lighting ratio. Though some retail shop doesn't have good uniformity in their general lighting, they must at least properly orient the customers by other means (like sign boards), not just by lighting.

Show-off the merchandise

Giving the correct color rendering and texture helps the customer evaluate the product properly. The more customers appreciate the fabric, color, texture, and other details of the merchandise, the more likely they will purchase.

This is not only applicable in the selling area, but most importantly in the fitting room. Customers must look good when they look in the mirror. Providing correct color rendering that enhances their skin tone and the fabrics, will boost the customer's emotional urge to buy.

Later, we will discuss the different lamps and luminaire that will help achieve this goal. It is not only the position of the mirror that makes the fitting rooms exciting but also the lighting.

Provide task light

This is to assist customers to read price tags and labels, and to facilitate customers' transactions. This is very important in the cashier area. Providing good lighting will also reduce mistakes in payment transactions.

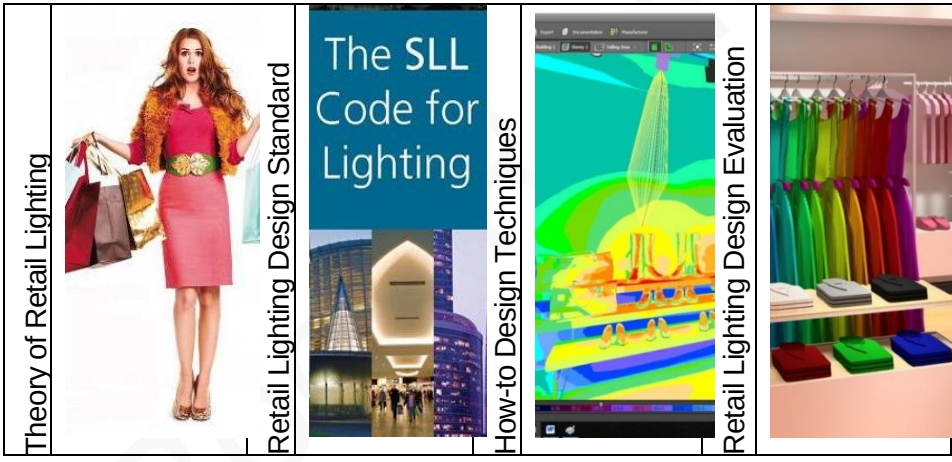
This task lighting within the cashier area will also help to identify the space, making it easier to find for customers. So, this light source can be both decorative and functional.

On the few pages, we will discuss how to light the cash counter under many different scenarios.

To summarize, the basic function of retail lighting is to: attract customers, guide them, show-off the merchandise honestly, and provide enough light for the sales staff.

Four Main Divisions of this E-book

There are four parts in this e-book. We have tried to make it simple and easy to read. The first part is all about the theory of lighting related to retail shops, the second, the standards concerning the retail lighting design, the third is “How-to’s” of doing a lighting design project, and last is evaluation chapters where we will analyze, evaluate and criticize some existing retail shops.



Theory of Retail Lighting

The first chapter focuses on the theory of retail lighting design, which includes a little history of retail shops, types of retail projects, reasons why do we need to provide amazing lighting design for retail shops, who is mostly benefits from the lighting design, and which are the leading brands of lighting manufacturers for retail shops. Please note, this list will be just my opinion. You may not

agree with it. I will not promote any brand. I will just say whatever I think is best, based on my experience.

To know more about the theory, we need to read. A lot! There are lots of books and websites where we can read about the theory, but if we really want to know the real application, we need to check what retail companies say about it. Other reliable sources for the theory of lighting are articles from designers and retail lighting manufacturers. Let's forget the old theories (that is from the general lighting standards) and move on to the latest trend (current fashion boutique trend).

Lighting Manufacturer have updated information about the latest trends in retail lighting design because it is most of the time their clients are the one who dictate what they want to see in these premises.

I suggest checking the following blogs, books and websites. I am not promoting any company or person. I just want to share reliable sites where we can get valuable information. If you want to add something to this list, please let me know so we can add it in our final e-book.

http://www.lightlive.com/en/limbiclighting

http://retaildesignblog.net/ - this is a highly recommended blog for retail design!

https://www.ies.org/store/lighting-handbooks/lighting-handbook-10th-edition/

http://retaillightinganddesign.com/

http://www.self-electronics.de/index.php/announce/index/id/192/lang/en

http://luxreview.com/global/retail

http://www.archlighting.com/search?q=retail+shops

https://www.shopify.com/retail/120040003-visual-merchandising-101-how-to-create-store-designs-with-high-converting-displays

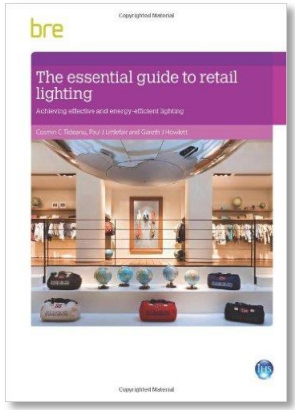
http://fitsmallbusiness.com/retail-store-lighting/

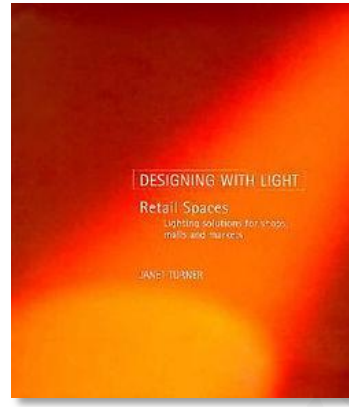
http://vivaldi.zumtobel.com/?_ga=1.77885716.1694906399.1447047226#/limbic

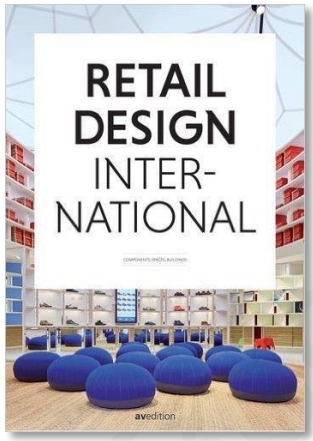
You could also check other strong brands for retail lighting, like Fagerhult, Philips, Erco, and Zumtobel. I would like to suggest looking at the retail application or project page, to see how they meet clients' requirements. Hey! You are not copying. You are just looking for inspiration.

Another way of studying the theory of retail lighting is to read books. Here are some suggested books that you can read some pages for free on Amazon.com.

If you are reading this e-book in your desktop, tablet or smart phone, just click the picture and it will automatically bring you to the web page.


bre
The essential guide to retail lighting
Achieving effective and energy-efficient lighting


DESIGNING WITH LIGHT
Retail Spaces
Lighting solutions for shops, malls and markets
JANET TURNER


RETAIL DESIGN INTER-NATIONAL
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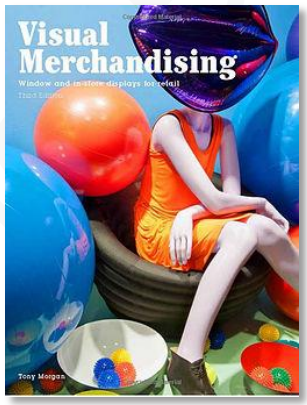
BASICS
INTERIOR DESIGN
01
Lynne Mesher
retail design


Visual Merchandising
Window and in-store displays for retail
Tony Morgan


Visual Merchandising and Display
Martin M. Pegler
SIXTH EDITION

I know, it sounds boring but I am not forcing you to read books. All I know is, if you really want to become an effective lighting designer who specializes in retail lighting, then, you need to read more. Hahaha! Let's accept the fact that we don't know everything. Being a lighting designer is always a continuous learning process.

Click the link below for more books to read.
http://www.nrocolightingdesign.com/books

Retail Lighting Design Standard

Now, when we say standard, it means either it must be followed or it is guidance. Two major standards that dominate our lighting world today, aside from local standards or regional standard, are those from the US and the European Union. It is no use asking why, what we need to do is to study both these standards and apply them as per the client's requirements.

For retail lighting, it is not very difficult to follow these two standards because retail lighting is based on perception, not on lux level. So, whatever these two say, the final decision is still driven by the crazy ideas of the designer and the company brand. As long as we follow the basic requirements, which involve the safety and security of the customers and, of course, the maximum load requirement of the mall or building, then we can do whatever we want. Amazing, right?

Here are some of the books for retail lighting design standards. Some of them can be downloaded for free. If you have a generous

friend who has a copy, ask them, but make sure you give them something in return. Like maybe other lighting designs information. Don't be just be a taker, it is always better to share.

Advanced Lighting Guidelines (ALG) www.algonline.org

The SLL Code for Lighting (CIBSE) www.cibse.org

The Lighting Handbook (IESNA) www.ies.org

If you want to add more to this list, please let me know. Aside from these three lighting design standards, you should also check your local or regional organization to see if they have separate lighting design guidelines. You must also ask the client or consultant which standard should be used before starting work on the design.

How-to Lighting Design Techniques

This is the part that I am sure will excite you most. This is the main part of this amazing e-book. I will discuss some techniques in this book, but most of it is available in videos, which can be found at https://www.nrocolightingdesign.com/video-tutorials. Please understand me; it is very hard for me to explain how to do it in words, it is much better to show it. I think that's why it is called "how-to" because you need to show it?

There is a series of tutorials. It will start from the basic information. A PowerPoint slideshows is given, then I will discuss the techniques on how to do it, and finally how to evaluate the design and prepare the documents. We will be using Dialux evo in the tutorials. I may

use regular Dialux to accommodate beginners and those who are only familiar with this software. Below are the video topics:

1. How to clean and understand the CAD file
2. How to build the retail shop in Dialux evo
3. How to create and import objects
4. How to select luminaires
5. How to aim the spotlights
6. How to create light scenes
7. How to generate and prepare the report
8. How to prepare the lighting layout

Website links will be given for every tutorial, which can only be accessed here in this e-book.

Comments, suggestions and questions will be part of the video to continuously improve our tutorials.

Retail Lighting Design Evaluation

In this last part, we will choose eight major retail shop brands that we will evaluate according to their style.

From this study, our objective is to see if branding really affects the lighting design or the other way around.

I'm sure you are also curious how these famous brands use lighting to attract customers. How they emphasize their brands and how they use lighting as their secret weapon to manipulate buyers to

purchase products. Hahaha! I'm sure, the way I mentioned it will make you think deeper. Don't be silly, it's just my opinion.

The brands we are planning to study are below:

1. Chanel
2. Prada
3. Gucci
4. Dolce & Gabbana
5. Guess
6. Lacoste
7. Diesel
8. Adidas

Chapter

2

Retail Shop Lighting Design Considerations

Light is the life-force of man-made structures. It is through light that events become meaningful. — *Prof. Edward P. Bartholomew*

So, you received a lighting design inquiry from your clients. You are very excited to work on it. You're itching to start work on it. You are so enthusiastic! Finally, you will design a retail lighting project. But before you do something crazy, you need to know this.

Before a lighting designer starts selecting luminaire and calculating the lighting design, he or she must find out (or ask the client) about the limitations, requirements, lighting concepts, and basic considerations in lighting design. Below is other important information necessary to start the design.

1. Brand or theme
2. Light Sources
3. Sustainability
4. Architectural design

Why is it important for us to get all this information before starting work on the lighting design? Because with this information, it will lessen the revisions, reduce errors and the main lighting design goal will be properly examined.

Some retail shops, especially the big brands, establish their design criteria before the job was handed to a lighting designer. What the lighting designer can do is to run the calculations and achieve the standard requirements for the specific areas. Without the basic lighting design considerations, the designer may stumble into different problems that will cause delays in the project delivery. Therefore, acquiring this basic information before you start will result in fast, efficient and correct lighting design.

Now, let's go and discuss these lighting design considerations one by one.

Brand or Theme

Designing the lighting for a retail shop is like dressing a woman. You must understand first what her character is, what she usually does, what her personality is like. Knowing the brand or theme of the retail shop is the main consideration. Is this shop for older people, for teenagers, or for corporate people?

The power of branding is the well-guarded identity of every company. The brand name is the most valuable asset, which gives credibility to the product and provides assurance of the quality. Have you ever bought a product that is branded? You feel

confident about its quality. It boosts your emotions and you feel proud about it.

As lighting designers, we must understand how these retail brands feel about their products and name. Lighting design must convey what they want to project to their customers.

Can you put cheap track lights in Gucci shops? No! Or would you?

Based on my experience, most of the leading retail brands have their selected luminaire brands as well. It is really interesting to see that they really look for the good quality even for lighting.

If you are dealing with the interior designer or architect, they will immediately tell you what they want. They may ask you some technical questions about your lighting design, but basically, they already know what they want to achieve and that includes the lighting effect. Right at their initial design stage, they already established how the lighting should be.

Most of the lighting layouts of big brands require strict attention to detail. If you are more of a technical person and not aesthetically driven, then the conflict between your mind and their mind will blaze. Hahaha! Good-luck to your ego!

I love writing this page because I can tell you beautifully about my experiences.

Now, you should forget your ego and just follow the client's wishes. You are there to support their goal, remember?

So, how would you find out the lighting style of these big brands? First, check the lighting concept from the interior designer or architect. Second, check the existing retail shops of this brand. If these two professionals don't have anything yet and this design is for the flagship store, then you must be very careful suggesting the lighting design. You must understand that lighting can either enhance or destroy any design.

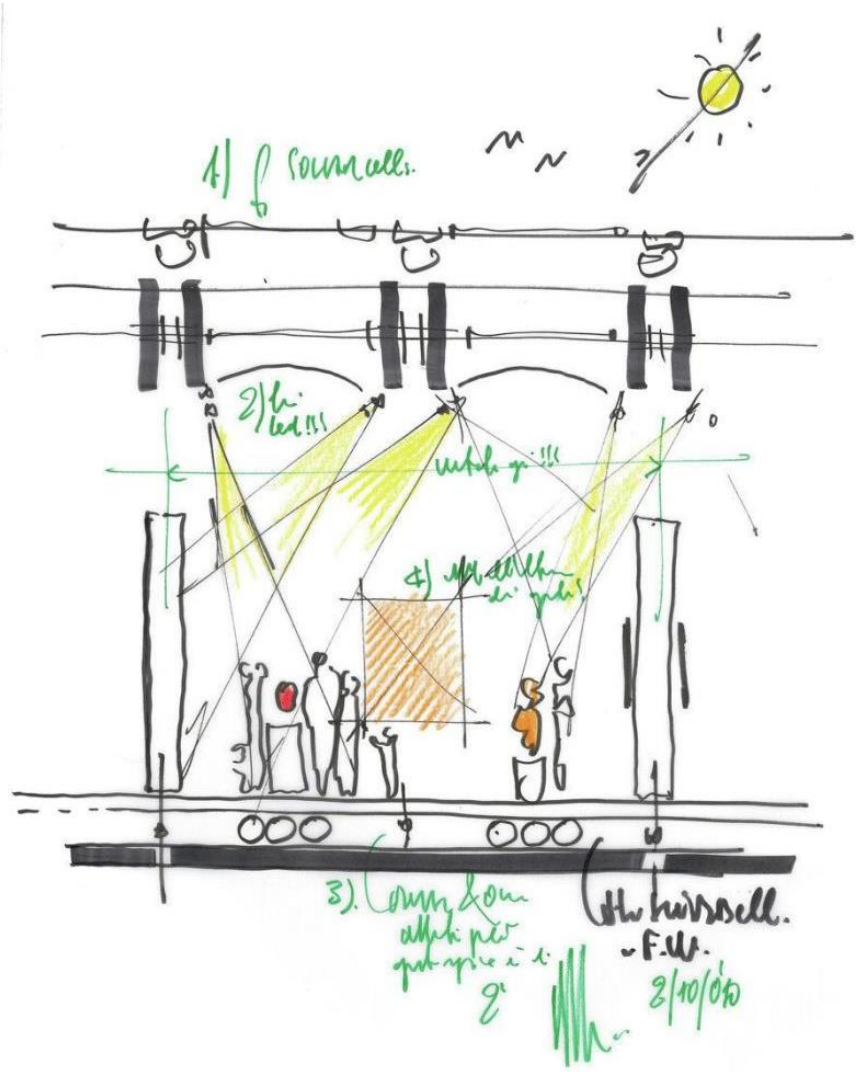
To make yourself look really smart, check the competitors of this brand and see how they light their shops.

Anyhow, don't worry. It is usually the problem of the interior designer or architect. They always have something in their mind. All you have to do is to help them find the right luminaire for whatever they imagined. Again, another warning; these two professionals will mostly be looking at the physical features of the fittings. They usually don't care about the lumen output, or if the glare is high, or if the color rendering is good. From here, brothers and sisters – that is our problem!

In our video tutorials, I will show you one lighting concept from big brands.

Meanwhile, below is a lighting concept from the famous architect Renzo Piano. He used to sketch in details showing how the lighting would look.

This is also what we should do when we are explaining our design to our clients. Sketching while explaining!



Source: http://www.archlighting.com/projects/structural-light-the-new-renzo-piano-pavilion-at-the-kimbell_o

Below are sample images of the lighting effect of famous retail brands. You will notice a distinctive similarity of lighting styles in all their branches. In the final chapter, we will discuss and compare these retails brands in terms of lighting style.

You will immediately see the choice of light color they usually use.

Light Sources

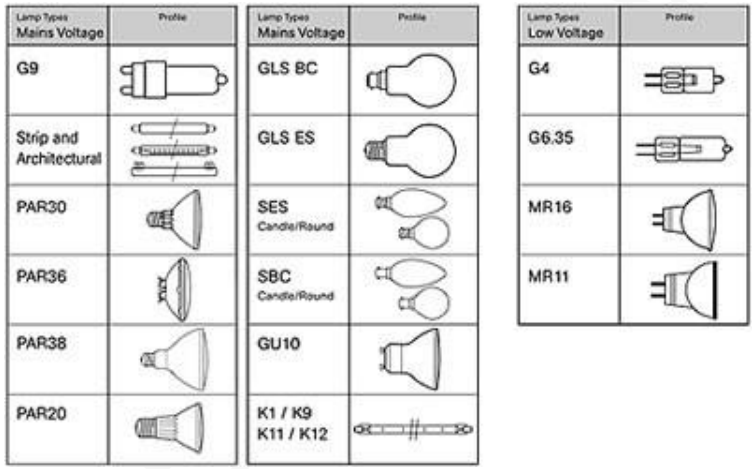
Once you identify the lighting effect the brand wants to convey, your next design consideration is what kind of light source you will use. Some retail shops prefer a crisp white light, while others choose a cozy, warm light.

Remember that the light source includes both daylight and artificial light. Some retail shops are outside the mall or commercial building. Daylight is one of the advantages and disadvantages of these retail shops. During daytime, the combination of these two light sources might not blend properly. Sunlight might create high glare and unwanted heat to the display window, though it will give good color rendering to merchandise.

Lighting controls or sensors are a must for this area to maximize the use of daylight and to help reduce energy usage.

So, now it is time for us to select the luminaire and the lamp to be used. It is better to ask the client if they prefer to use LED or conventional lamps. Most of the lighting manufacturer today use LED in their products. Our lamp technology is now heading towards LED due to its efficiency. But still, some retail shops prefer the sparkling effect of halogen or metal halide. You need to find out what type of lamp should be used before running the calculations.

Below are some types of lamps:



Source: http://jerri13.blogspot.ae/2014/01/types-of-lamps.html

If you are working as a lighting designer in a lighting manufacturing company like me, make sure you study the lamp codes of your luminaire. For example, in Thorn Lighting *SAP Code 96642625 — CHAL PRO LED2400-930 HFIX RMB W6*, the **LED2400-930** code means: the lamp is LED with 2400 lumen, 90 CRI and 3000K CCT. The rest of the code is the fitting name, the ballast and the materials or reflector. Sometimes IP rating is also included in the code.

Aside from the type of the lamp, your next assignment is to know what kind of luminaire to use. Track lights are common light fittings for retail shops. They not only give different beams, but are also flexible in terms of adjusting the location and direction. You can easily highlight the merchandise even if the location or direction of the furniture changes.

Later in this chapter, we will discuss one by one the advantages and disadvantages of these luminaires. Below is an image of the different types of luminaires and their light effects:

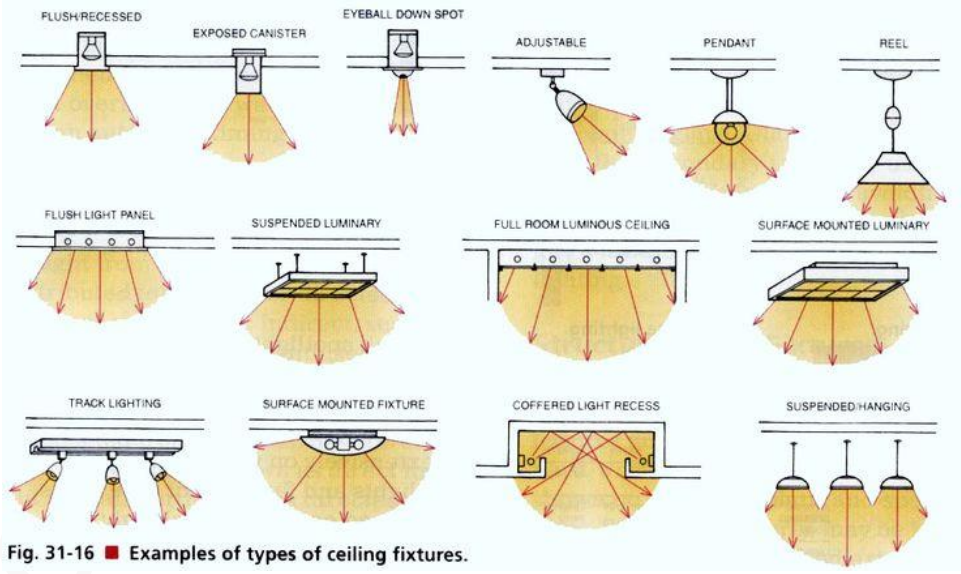


Fig. 31-16 ■ Examples of types of ceiling fixtures.

Source: http://zenmerchandiser.com/visual/types-of-lighting-fixtures-for-retail-stores/

Sustainability

Now we are done with acknowledging the brand and selecting the possible uses of lamps and light fittings, it is time to consider the environment and the health of the people who enter and work inside the retail shop.

Sustainability doesn't only mean how the lighting manufacturers extract and dispose of the luminaires. It also includes how the retail shops' owners benefit from sustainable lighting design solutions, like using daylight and efficient luminaires. Efficiency involves giving the correct illumination whilst reducing the energy use.

Make sure to discuss with your client if they are aiming for LEED certification or any other Green Building verification.

Below are some factors of sustainable lighting design solutions:

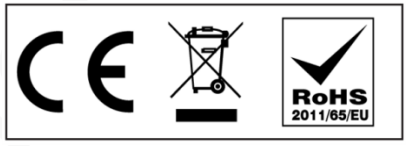
1. Lighting control – when creating light scenes inside the shop with where daylight is available, lighting controls will definitely be useful for achieving a sustainable design. Lighting control will also reduce the energy usage. Fitting rooms don't need to be lit when nobody is using them. With the use of lighting control, light will only be given in the right amount, in the right place, and at the right time.

   Just a warning, although lighting control helps to save energy, it will need a huge initial investment from the client. You need to explain this first to your salesman before suggesting its use.

2. Maintenance – using efficient lamps and luminaires will reduce both the amount of time spent on maintenance and frequency with which lamps are replaced. This will be beneficial for the retail shop owner due to low maintenance costs.

3. Lamp and luminaire disposal – our environment (including our air and water) is being ruined by garbage. Proper lamp and luminaire disposal is a must to protect our environment. As lighting designers, we must educate our clients about the environmental certifications, like WEEE (Waste Electrical and Electronic Equipment Directive) and PDC (Product Declaration Certificate). Mention that your company complies with these certifications; this will give them the feeling of being responsible in taking care of the environment.

I would suggest you get involved with, or at least become aware of green building certifications like LEED or BREEAM. You can also take exams for these certifications to become a certified green building professional.



BREEAM®

Architectural Design

Retail brand is done, type of lamp and luminaire has been decided, and the sustainability options are being considered. The last thing that you need to check is the architectural design which includes furniture layout, ceiling layout and the materials used. These features will greatly affect the lighting design results.

Once you have received all the drawings from the client, check them before you start working on the lighting design. Make sure the drawings are clear and complete.

These are some of the drawings you need to check:

1. Furniture layout – retail lighting needs visuals. You can easily focus the light to gondola or shelves if available. You can also judge the light level by looking at the pseudo-colors that are produced in these objects.

Running the calculations in a retail project is totally different from other indoor lighting applications like an office or warehouse. You don't necessarily need to produce a good overall lighting uniformity or lux level. Remember retail lighting design depends on the lighting effect that the brand wants to convey. That's why putting objects in your calculations gives you a better idea about whether your design is good or bad.

Later we will discuss more of these in the lighting calculation part.

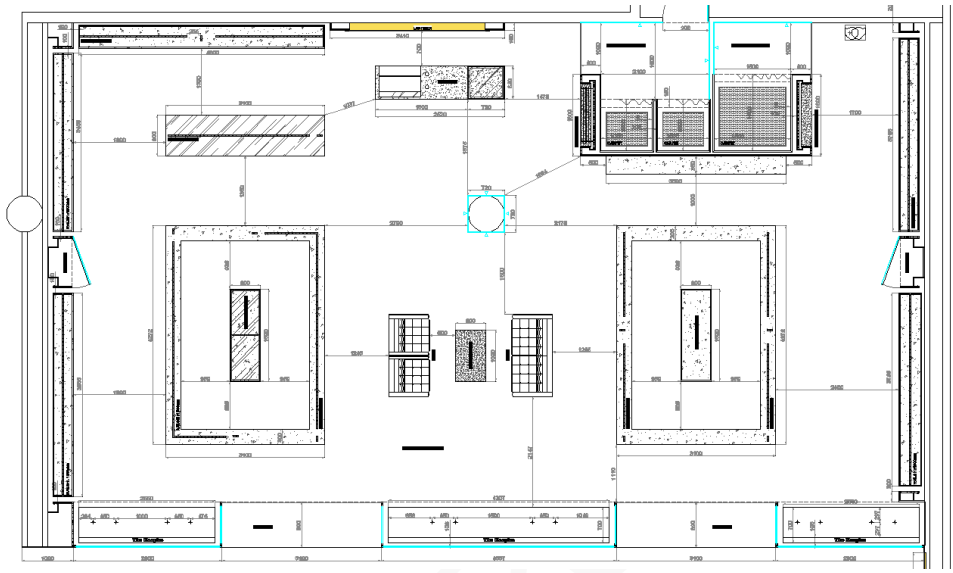


Image 1: Sample retail furniture layout.

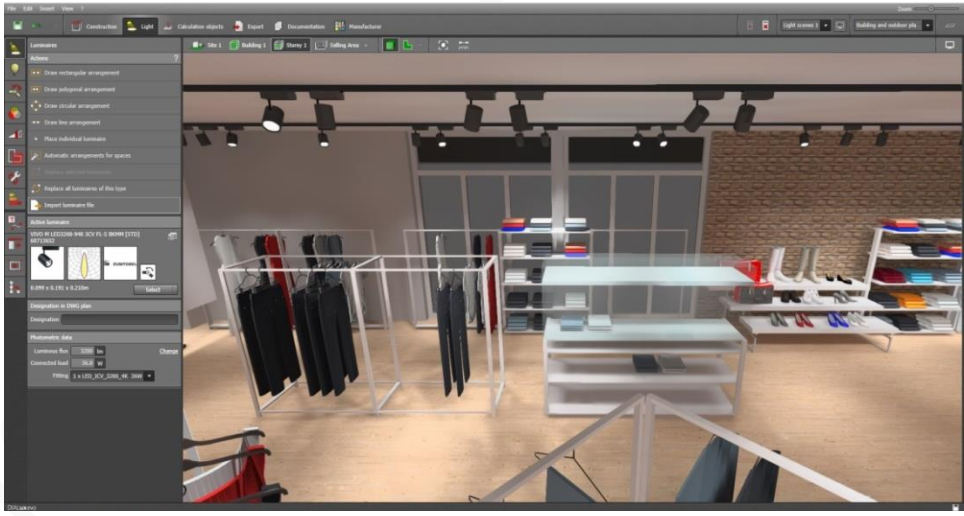


Image 2: Furniture image in Dialux evo.

Ask the client for details of the furniture so you can build the 3D objects, or if they have Sketchup files or .3ds files for these objects, then it is much better.

You can export the Sketchup file into .3ds. We will discuss this part in our video tutorials.

If you don't want to create the objects yourself, you can download some free from the internet. The most commonly used website to get these .3ds objects is http://archive3d.net/. Be careful when downloading large files because it will slow down your computer. Choose objects that are less than 1mb in size.

You can also use PCon Planner software to convert 3d files from 3DWarehouse. This software is much easier to use and there is no expiry date in converting objects to .3ds files compare to Sketchup.

There might be other websites that offers free 3d objects. If you know more, please let us know so we can share it to other lighting designers. This website will receive free advertisement as benefit.

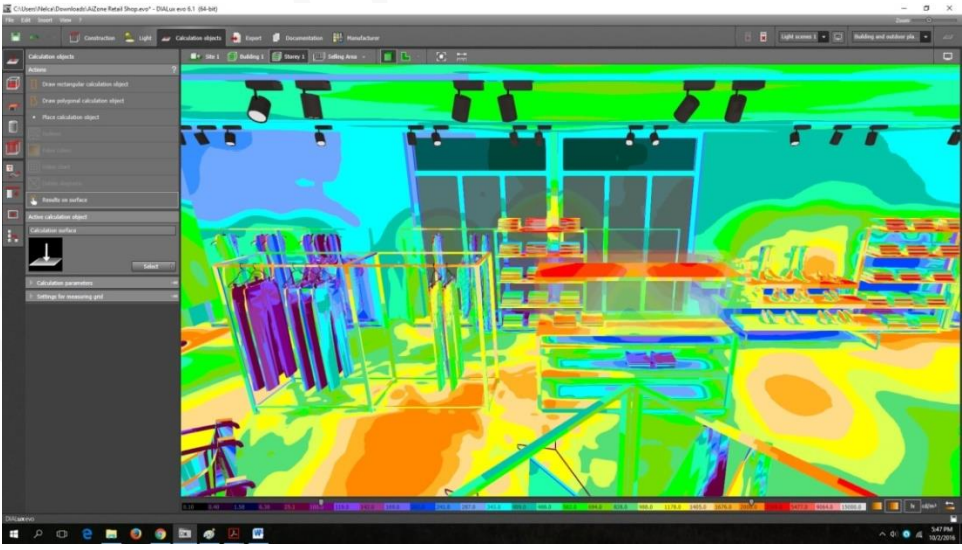


Image 3: Pseudo-colors in furniture.

2. Ceiling Layout – the next thing you need to look at is the ceiling layout. Here, you will check the height, the channels, the track lights and the locations of other utilities that may obstruct your luminaires.

You need to understand that a wrong mounting height will give you the wrong result. So be careful with that. Sometimes, Dialux evo doesn't automatically insert the luminaire at the ceiling height. It is better to check it both in plan view and elevation view.

Below is the sample image of reflected ceiling plan. Showing the channel or groove and its spacing to each other.

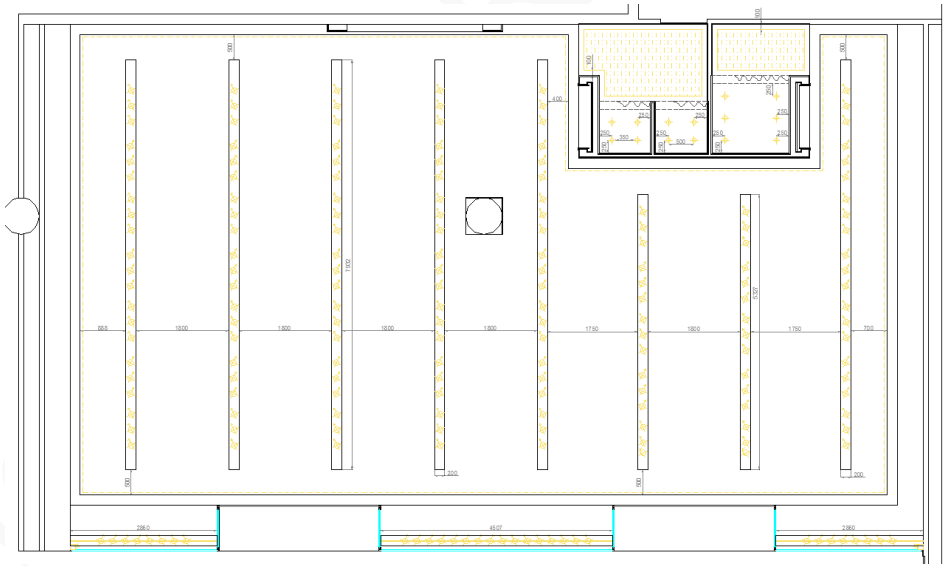


Image 4: Sample reflected ceiling plan.

Image 5: Sample 3D view showing the ceiling design.

3. Materials used – there are default reflectance factors in Dialux evo, these are: 70, 50, and 20 (70 for ceiling, 50 for walls, and 20 at the floor). Once these values change, lighting levels will change dramatically as well. It is important to apply the materials that the designer is planning to use, so that you will increase your chances of getting the same result in the actual installation as when you run the calculations.

You can ask the interior designer or architect about the textures that they used in their design. Otherwise, you could get it from our friend Google. For example, if they specify black granite, then just type "black granite texture" into the search tab and, for sure, Google will give you a lot of options. Once you save it, you can then use it as the texture in your design.

I will show you on how to do this in our video tutorials in the next chapter. I am sure you will enjoy it!

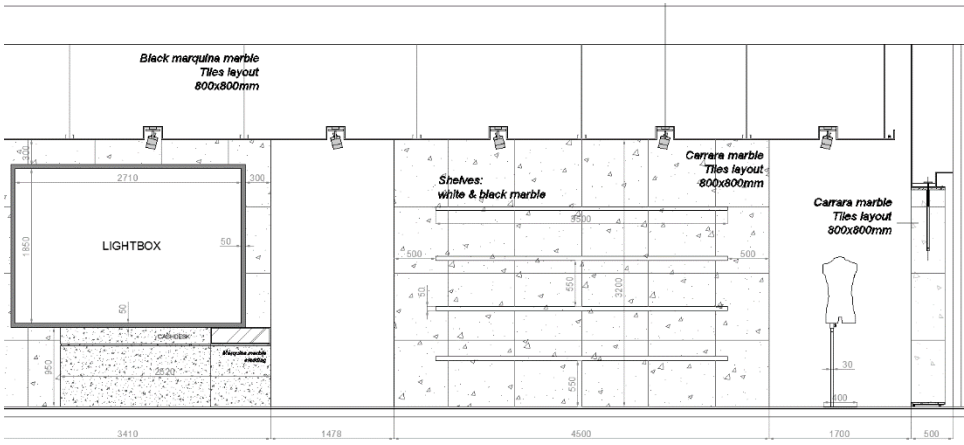


Image 6: Sample elevation view showing the materials to be used.

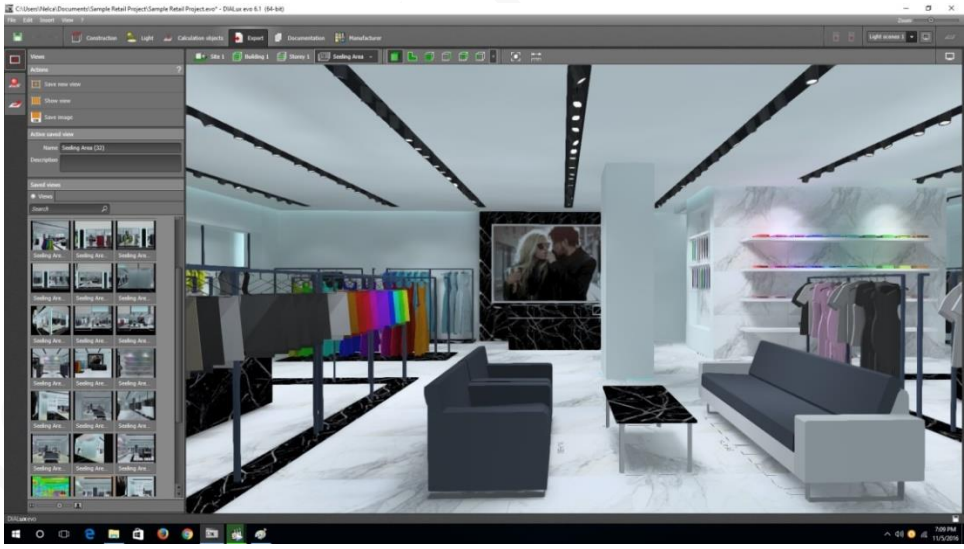


Image 7: 3D image showing the texture and colors of shelves and walls.

Chapter

3

Retail Lighting Design Standards

If you can read this, there is light. - Olafur Eliasson

There are different organizations that set design standards for lighting, and the design will then depend on the region or country in which it is located. Most of the standards refer to the local situation.

For this application, we will focus on the guidelines for following:

1. Lux Level
2. Overall Uniformity
3. Glare
4. Light Effect
5. Color Rendering
6. Color Temperature
7. Sustainability Standards

There are also local standard requirements, like Shopping Mall requirements or Municipality requirements. The standards we will discuss focus on international requirements.

We will use the most popular lighting guidelines: the CIBSE and IESNA. If you are working with retail projects that have local requirements, then that local requirement must prevail, or sometimes whichever is more stringent.

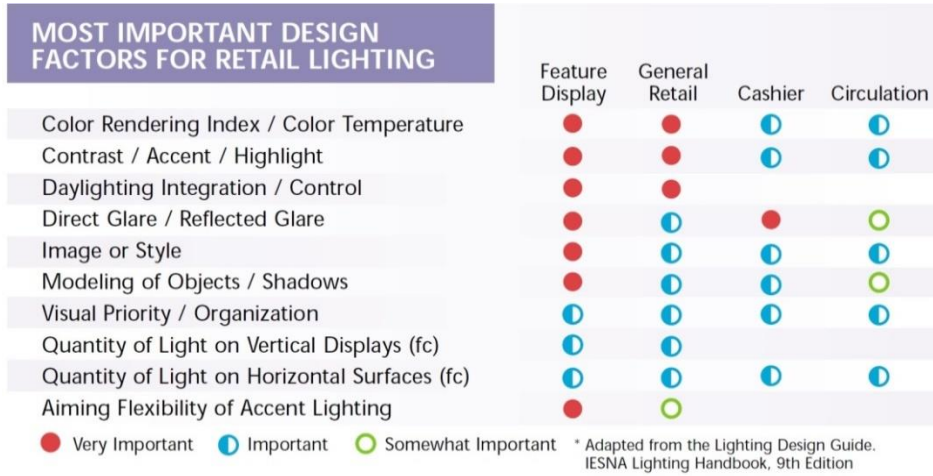
It is best to ask the client in the early stages which standard to follow before you start working. If they don't know, then check your country about the default guidelines. For example, here in the UAE, we always follow the EU standards due to the big influence of Europe on this country. Some projects that we have handled have US requirements, but that is very rare.

Below is an image from the IESNA Lighting Handbook. It shows the most important design factors for retail lighting.

The key is very obvious, the dot legend signifies how important each requirement is. A red dot is very important, half blue is important, and the empty green dot is somewhat important.

When you are using this dot matrix, make sure you double check that it agrees with the branding. If not, follow the branding lighting requirements. This is just a basic guideline.

In the next chapter, we will discuss more detailed explanations of the requirements for each factor in every area.



MOST IMPORTANT DESIGN FACTORS FOR RETAIL LIGHTING

	Feature Display	General Retail	Cashier	Circulation
Color Rendering Index / Color Temperature	●	●	◐	◐
Contrast / Accent / Highlight	●	●	◐	◐
Daylighting Integration / Control	●	●		
Direct Glare / Reflected Glare	●	◐	●	○
Image or Style	●	◐	◐	◐
Modeling of Objects / Shadows	●	◐	◐	○
Visual Priority / Organization	◐	◐	◐	◐
Quantity of Light on Vertical Displays (fc)	◐	◐		
Quantity of Light on Horizontal Surfaces (fc)	◐	◐	◐	◐
Aiming Flexibility of Accent Lighting	●	○		

● Very Important ◐ Important ○ Somewhat Important

* Adapted from the Lighting Design Guide. IESNA Lighting Handbook, 9th Edition

The guideline above shows how the Color Rendering Index (CRI) and Correlated Color Temperature (CCT) are very important in display areas, while Glare is important for cashier areas. Circulation areas don't need much attention, but for some retail shop circulation areas need all these important points.

Check this video to learn about the Lighting Standard for Retail from IESNA Lighting Handbook. You may also download the PowerPoint presentation and the PDF chapter extracted from the book. Enjoy reading!

Lux Level

What is Lux Level? Obviously, as a lighting designer, these words are the most basic information you must understand. Dude, you cannot become a lighting designer if you don't know this.

For a formal definition, see below. This is from our supportive friend, Mr. Wikipedia. You may find the similar definitions from other books.

The **lux** (symbol: lx) is the SI unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square meter. In photometry, this is used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface.

There will be more terms that you need to understand, such as the difference between luminance and illuminance, candela, luminous flux, etc. The more terms you know, the more conversant you are. Find the definitions here, http://lowel.tiffen.com/edu/glossary/.

Code For Lighting 2009	Retail Premises			
	Maintained Illuminance (Lux)	**Limiting Glare Rating**	**Minimum Colour Rendering (R_a)**	**Notes**
Sales area	300	22	80	1
Till area	500	19	80	
Wrapper table	500	19	80	

Notes:

1. Both illuminance and UGR requirements are determined by the type of shop

Illuminance values may be varied to suit circumstances see Illuminance

The desired light level or lux level will depend on the brand requirements. But, if the client doesn't know what the lux level should be, then you can use the SLL Code for lighting as your basic guidelines. As per this Code, **Sales area** must have at least 300 lux with 22 UGR and 80 CRI. Please explain these numbers to your client, tell a story to help them visualize the numbers. I remember one client who asked what 20 lux looked like. Hahaha! I was amazed by his question because I kept saying we should achieve 20 lux, and then suddenly he asked about it. I told him; "Imagine you are walking on a major roadway with no buildings on either side". He just said, "I see", looking not so convinced. So, I pulled out Mr. Wikipedia's table (see below) and he said, "OK". Again, you must psychologically analyze whether he really understands it or not.

Examples	
Illuminance	**Surfaces illuminated by:**
0.0001 lux	Moonless, overcast night sky (starlight)[3]
0.002 lux	Moonless clear night sky with airglow[3]
0.27–1.0 lux	Full moon on a clear night[3][4]
3.4 lux	Dark limit of civil twilight under a clear sky[5]
50 lux	Family living room lights (Australia, 1998)[6]
80 lux	Office building hallway/toilet lighting[7][8]
100 lux	Very dark overcast day[3]
320–500 lux	Office lighting[6][9][10][11]
400 lux	Sunrise or sunset on a clear day.
1000 lux	Overcast day;[3] typical TV studio lighting
10 000–25 000 lux	Full daylight (not direct sun)[3]
32 000–100 000 lux	Direct sunlight

For **Till Area** or **Cashier Area** and **Wrapper Table**, we need to have 500 lux, 19 UGR and 80 CRI. This area may seem to need more light, but the current trend is for the highlighted merchandise to need more light and cashier area is sometimes lighted similar to general areas.

But then again, CIBSE has a note saying these illuminance and UGR will be determined by the type of shop, and the illuminance values may be varied to suit circumstances.

Most of the retail shops that we designed require at least 700 lux in general areas, 1500 lux at the entrance and 2000 lux on the merchandise. These may seem too much, but this is what the client wanted the shop to look like and they have their own reasons. SLL did not mention the overall uniformity. But, some of the retail shops we designed asked for at least 0.50 oU in general areas (with objects inside). What???! Amazing, right? How can we do that? That is one of the secrets you will learn from this e-book. As per our previous topic, we must ask our clients for this basic information before starting work on the lighting design.

Below are some recommendations for retail applications.

Recommended Illuminance for Retail Applications

Area	Illuminance (lux)	Glare index	Comment
Fashion & household stores			Light both vertical and horizontal planes

Department store	500	19	
Chain store	750	19	
Specialist retailer	500	19	
Food store			Light vertical displays
Supermarket	750	22	
Grocery/vegetable store	500	19	
Retail catering outlets			Consider point of sale lighting at design stage
Food court	300	19	
Fast food outlet	500	19	
Family restaurant	200	19	
Small retail outlets	500	19	Newsagent, stationer, bookshop, chemist, jeweller
Do-it-yourself			
Superstore	1000	22	
Car accessory store	1000	22	
Electrical/furnishing store	750	19	
Hardware store	500	19	
Garden centre - indoor	500	22	High amounts of daylight desirable. Special light sources may be necessary in plant storage and sales.
Showrooms	500 - 750	-	
Covered arcades and malls	50 - 300	22	Dependant on ambience required and balance with shop window lighting and illuminated signs.

Areas/Tasks	Description	Type of Activity Area*	Illuminance (FC)[2]
Circulation	Area not used for display or appraisal of merchandise or for sales transactions	High Activity Medium Activity Low Activity	30 20 10
Merchandise (Including Showcases and Wall Displays)	That plane area, horizontal to vertical, where merchandise is displayed and readily accessible for customer examination	High Activity Medium Activity Low Activity	100 75 30
Feature Displays[3]	Single item or items requiring special highlighting to visually attract and set apart from the surround	High Activity Medium Activity Low Activity	500 300 150
Show Windows Daytime Lighting General Feature Nighttime Lighting General Feature			 200 1000 100-200 500-1000

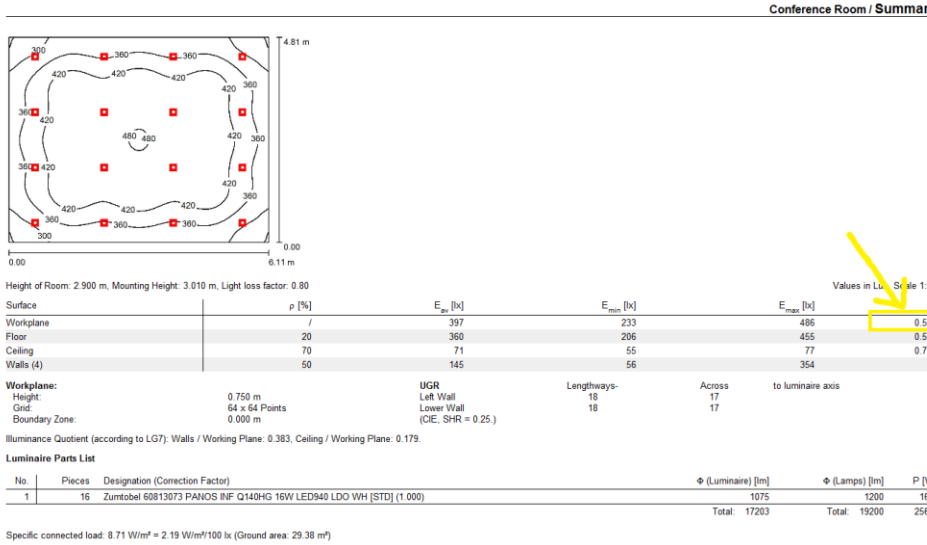
*One store may encompass all three types within the buildings.
High Activity: Merchandise is usually displayed in bulk and is readily recognizable as to its use. Evaluation and viewing time is short. Minimal sales assistance and few customer amenities are available. Included in this category are mass merchandisers, warehouse sales, grocery and discount stores, auto parts departments, and hardware departments.
Medium Activity: Merchandise is familiar, but the customer may require time or help in evaluation of quality or usage or in the decision to buy. Some sales assistance and customer amenities are available. Included in this category are department and specialty stores.
Low Activity: Merchandise is generally exclusive, of the finest quality and highest price. Personal services and premium customer amenities are expected. Shopping is generally unhurried. Included in this category are fashion boutiques, designer signature shops, jewelry stores, fur salons, and fine art galleries.

1. IESNA Lighting Handbook, 8th Edition
2. Maintained on the task or in the area at any time.
3. Lighting levels to be measured in the plane of the merchandise.

The table above is another recommendation from the IESNA Lighting Handbook, 8th edition. The conversion of foot-candle to lux is 1 fc = 10.7639 lux. You may use this table if your client is US based or if their unit preference is in foot-candle. Well, we need to adjust ourselves from time to time.

Overall Uniformity

What is Overall Uniformity? It is the ratio of minimum illuminance to average illuminance on a surface. If you are familiar with the Dialux software, here is what it looks like. (See image below)



Conference Room / Summary

4.81 m

0.00

0.00

6.11 m

Height of Room: 2.900 m, Mounting Height: 3.010 m, Light loss factor: 0.80

Values in Lux, Scale 1:62

Surface	ρ [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	397	233	486	0.588
Floor	20	360	206	455	0.571
Ceiling	70	71	55	77	0.772
Walls (4)	50	145	56	354	/

Workplane:
Height: 0.750 m
Grid: 64 x 64 Points
Boundary Zone: 0.000 m

UGR

	Lengthways-	Across
Left Wall	18	17
Lower Wall	18	17

(CIE, SHR = 0.25.)

to luminaire axis

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.383, Ceiling / Working Plane: 0.179.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	16	Zumtobel 60813073 PANOS INF Q140HG 16W LED940 LDO WH [STD] (1.000)	1075	1200	16.0
			Total: 17203	Total: 19200	256.0

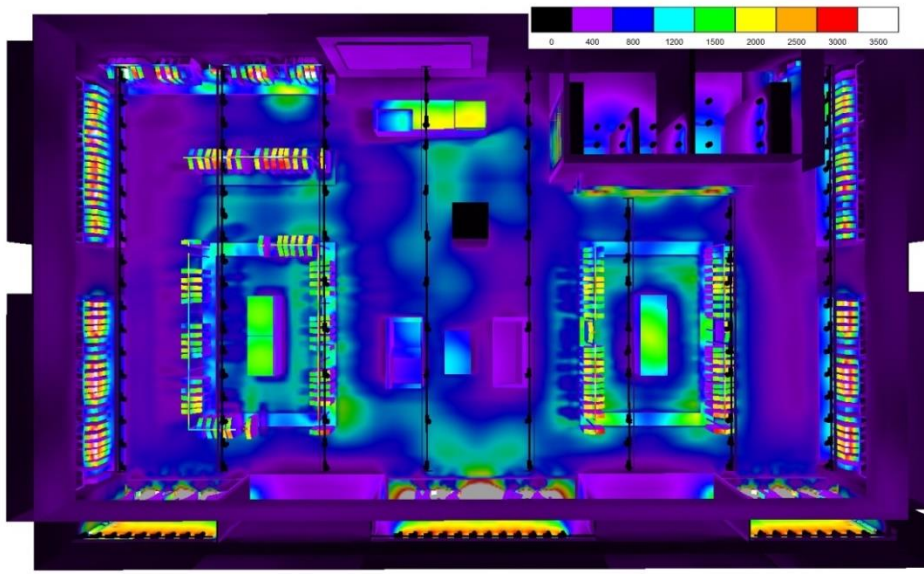
Specific connected load: 8.71 W/m² = 2.19 W/m²/100 lx (Ground area: 29.38 m²)

The example above is for Office Application. However, for Retail Lighting Design, uO can be properly evaluated using the Pseudo Color because of the objects used in the calculation. Please note that you need to include the objects like gondolas, shelves, mannequins, etc. in your calculation because it is the only way you can properly judge if the spotlight is targeting the specific object or the track-lights really do reach the shelves on the wall, or the overall general area has enough light. It will also give you the correct values when the contractor or installer asks for the aiming diagram.

When you take uO in the retail shop calculations with objects inside it, it will give you poor results due to the fact that some areas will give 0 lux value because of furniture blocking the calculation surfaces. So, it is better to judge it using pseudo-color. In the next chapter, I will show you some of our presentations to evaluate the

lighting design results for retail applications. Meanwhile, see the image below to see how the pseudo-color looks in a retail shop with good uO and with objects included. You can instantly identify if the merchandise is properly lighted.

This image used the standard pseudo-colors, although the value changes. For this example, the minimum color value is 400 lux (purple) and the maximum is 3500 lux (white). This shop has a light ratio of 1:15, it has theatrical effect.



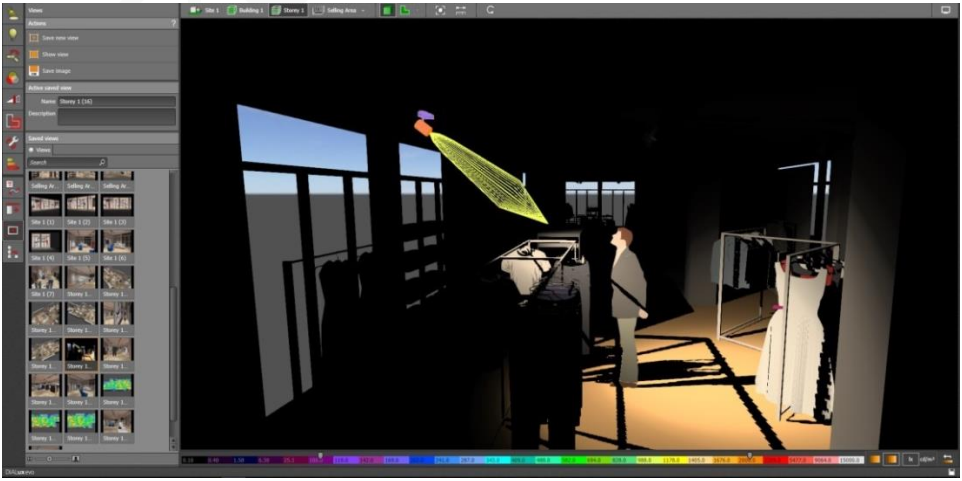
As per the SLL Lighting Handbook, regardless of the shop's profile, general lighting should be uniform, at least 0.70 overall uniformity (uO). But of course, you can only achieve this in the lighting calculations if you remove the objects and you dim down or turn off the decorative luminaires.

If you really want to show the 0.70 uO to your client to comply with the code, then, just remove the object and turn off some decorative lights. But, most of the time, having 0.70 uO is for big box retail shops and non-specialized outlets only. If they really do insist, then follow my instructions above. Always keep them happy. Wink!

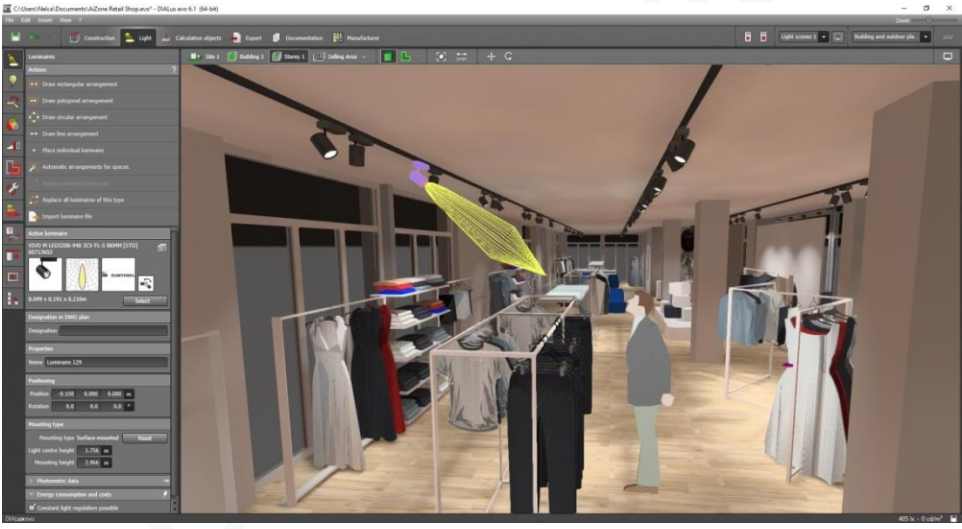
Glare

What is Glare? We have two kinds of glare: direct and indirect. **Direct glare** is caused by bright areas, such as luminaires, ceilings and windows that are directly in the field of view. Indirect **glare** is caused by light that is reflected to the eye from surfaces that are in the field of view - often in the task area.

Glare might seem like a subjective term, but it is actually calculated using a precise formula. Essentially, this formula measures the luminance of a lamp divided by the background of visible luminance from the room. This number is called the **Unified Glare Rating**, or **UGR**, and it ranges from 5 to 40.



Although we really want to show off the merchandise by focusing more lights on that object, (maybe, we want a little sparkle), we still need be careful about the glare it creates for the customers. We don't want customers to leave the premises with a head-ache. We want them to come back again and enjoy a pleasant experience inside the store; we want them to be happy and comfortable, at least with lighting aspect. Below is an image that may cause glare to the customer.



Spotlights must not be aimed more than 20 degrees towards the area where the customer usually stands. You can go more than that if it is aimed towards a wall or another area that doesn't have people passing by or standing. This is critical in display windows where there is no back wall. You might get the right effect on the display window, but it may create glare to the customers inside the store.

Light Effect

What is light effect? It will be synonymous with luminance. It is the only basic lighting parameter that is perceived by the eye. It specifies the brightness of a surface and is essentially dependent on its reflectance, which includes the finish and color of the materials inside the store.

Although light effect is the only parameter that is perceived by the customers, it is subjective to the people who see it. How do retail shops use and measure this for their benefit? Have you ever noticed that when you enter a retail shop, you can easily feel its significance through its use of lighting? Try entering a sports clothing, or baby clothing, or corporate clothing shop. With the character of these shops, lighting also varies. This is because lighting effect must complement the type of merchandise the retail shop wants to sell. This is closely related to what we discussed in the previous chapter.

We previously discussed the overall uniformity used in retail lighting application. This section is a continuation of that topic. When we say that the previous pseudo-color has Theatrical effect, it means that the difference between the background and the accent lighting is great. There are other retail shops where the lighting is Dramatic in effect. To know more about it, let's go and check the guidelines.

According to the SLL Lighting Handbook, the luminance of the merchandise lit has to be higher than the luminance of its immediate background. It is obvious because we need to focus the attention of the customers on the merchandise rather than the texture or color of the floor and wall.

Below is a table showing the Luminance Ratio for different strengths of accent lighting. You may use this guide to identify the branding of a retail shop.

Luminance Ratio (accent/background)	Strength of accenting
1	None
2	Noticeable
5	Low theatrical
15	Theatrical
30	Dramatic
>50	Very dramatic

In my opinion, most of the big retail shop brands prefer to have lighting effects that are from Theatrical to Very dramatic. You may notice it specifically in their window displays and highlighted merchandise. See this Gucci shop in Singapore (see image below). Lights focus on the merchandise and it leaves the other areas lighted with only cove lights and spill lights from the recessed gimbal spotlights. From this picture, I would say the ratio of luminance for this shop is Dramatic.

In the final chapter, we will evaluate more shops in terms of their lighting design. We will criticize, appreciate and comment on how they do it.

Another thing to consider finding the right lighting effect for a shop is who the target customers are. You would not use a Very Dramatic

lighting effect in maternity or baby clothing shop; you would use soft diffuse lighting instead, to show cleanliness and purity.

Likewise, you wouldn't use diffuse uniform lighting in corporate or active clothing shops, like those below. You must show the exclusiveness and formality.

Later in this chapter, we will discuss Limbic® Lighting. This is a study done by ZumtobelGroup in partnership with Gruppe Nymphenburg discussing the different characters of customers and how you can entice them to actively buy more and feel happy.

Color Rendering

The **Color Rendering Index** (**CRI**) is a scale from 0 to 100 percent indicating how accurate a "given" light source is at **rendering color** when compared to a "reference" light source. The higher the **CRI**, the better the **color rendering** ability.

This is very important in retail application. This is where we need to show the true color of the merchandise. No cheating, no light manipulation, just a true color to show off. This is where the luminaire and lamp manufacturers keep on fighting and trying to be the best. Few luminaires can truly show correct color rendering. If you find one, don't be surprised if this fitting is very expensive. Philips has True Crisp White Light, Zumtobel has True Gamut Rendering in the full color spectrum, and others are claiming to have 90CRI in their lamps.

The graph below shows where we can get the best color rendering. Aside from daylight, some lamps can successfully achieve this.

Colour rendering index R_a	≥90	80–89	70–79	60–69	40–59	20–39
Daylight	•					
LED	•	•	•			
Halogen lamp	•	•				
Compact fluorescent lamp	•	•				
Fluorescent lamp	•	•	–	–	–	
High-pressure mercury lamp				–	–	
Metal halide lamp	•	•		–		
High-pressure sodium lamp		•		–	–	–

– = Banned or no longer recommended under EU Regulation 245/2009 (EUP), due to low efficiency and inappropriate colour rendering.

We must use good CRI in our design. This does not necessarily mean that we will use CRI 90 in all parts of a retail shop; we may use CRI 80 in general areas.

The image below shows the difference between good CRI luminaire and those that are not. CRI 90 to 100 is the best color rendering in retail shops. It will show the true color of the fabric, and the texture will be properly highlighted.

Some retail shops use light to manipulate the judgment of their customers. The customers may then find that clothing is all pretty in the shop, but are disappointed once they reach home and find that it looks different. This is one of the main causes of unhappy customers, which in turn affects the integrity of the retail shop or even the brand.

As lighting designers, we must help our clients select the best luminaire to showcase their products with honesty and sophistication. If you are working for lighting manufacturer and you want to promote your product, be honest with your design and explain briefly to your client what the benefit will be of using good

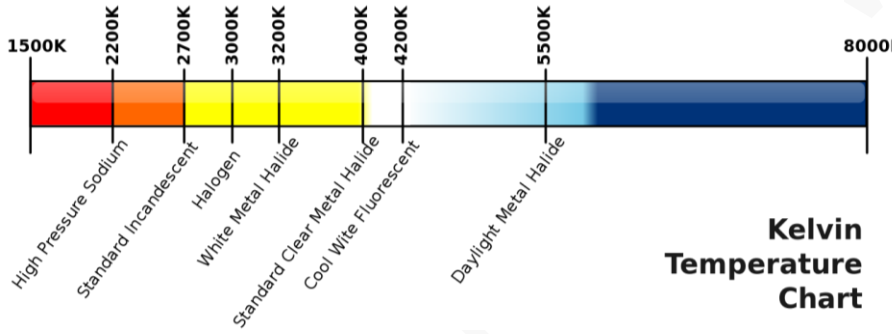
CRI in lighting, especially in retail shop projects. You may need the help of your salesman or marketing guys to give you all the information you need.

Check this video to learn about the Lighting Standard for Retail from the SLL Lighting Handbook. You may also download the PowerPoint presentation and the PDF chapter extracted from the book.

Color Temperature

The **correlated color temperature** (**CCT**) is a specification of the color appearance of the **light** emitted by a lamp, relating it's color to color of **light** from a reference source when heated to a particular temperature, measured in degrees Kelvin (K).

It is a way to describe the light appearance of a light bulb or lamp. It is measured in degrees Kelvin (K), on a scale from 1,000 to 10,000. Typically, commercial and residential lighting application Kelvin temperatures fall somewhere on a scale of 2000K to 6500K.

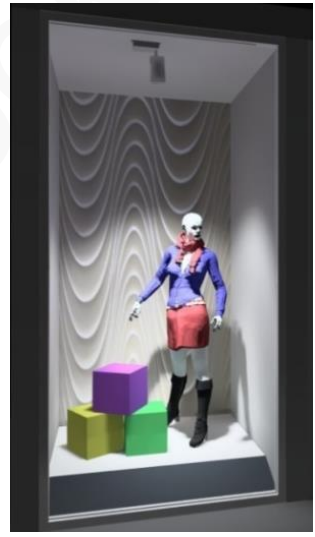
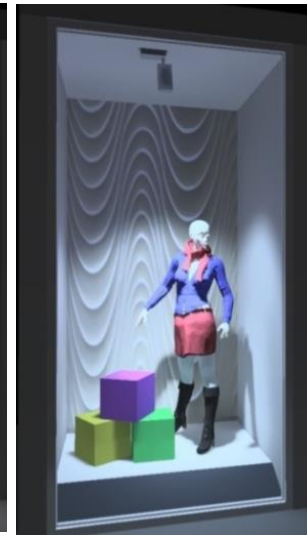


How important is color temperature and where we can use it? Below is a chart identifying different Correlated Color Temperature (CCT) with its character and its applicable areas to be used for?

	2000-3000K	3100-4500K	4600-6500K
Color Temperature (KELVIN)	2000K - 3000K	3100K - 4500K	4600K - 6500K
Light Appearance	Warm White	Cool White	Daylight
Ambience	Cozy, calm, inviting, intimate	Bright, vibrant	Crisp, invigorating
Best for	Living room, kitchens, bedrooms, bathrooms, restaurant/commercial ambient lighting, decorative outdoor lighting	Basements, garages, work environments, task lighting, bathrooms	Display areas, security lighting, garages, task lighting

In retail application, CCT is important to set the mood of the customers. Warm color is welcoming and produces a homely effect, while white color conveys formality and elegance. CCT also affects the branding. The simple choice of light color will immediately boost the feeling of the customers. This strategy must be well planned.

The images below show how a window display can be lighted with different color rendering. CCT and CRI must work hand-and-hand, showing the color and texture of the merchandise. Since this is again a subjective matter, the light effect will be judged by how the brand wants its products be perceived - formal or cozy, classy or rugged, elegant or jagged. It all depends on the brand and the type of the merchandise.

Sustainability Standards

What are Sustainability Standards? Aside from the above lighting design guidelines or standards, there are also guidelines in terms of sustainability. Some retail shops now are aiming to achieve a Green Building Certification. This certification is either from LEED or BREEAM. Other local green building standards exists in some countries like Estidama in the UAE.

Energy efficiency is the main concern of sustainability. Make sure you check the maximum LPD (Lighting Power Density) for retail shops. According to ASHRAE/IESNA Standard 90.1-1999/2001/2004, the LPD for retail shops is 1.5 or 1.9 W/sq.ft using the building area method, and 1.7 or 2.1 W/sq.ft using the space by space method. If your client is aiming for LEED Certification, then you need to understand it more.

Below are some of the benefits of green building certification for retail shops.

1. The project will be recognized for its sustainability, which means the project uses products and materials that are responsively manufactured and imported to the site. The project saves energy and uses efficient luminaires for lighting, and other factors concerned with taking good care of the environment.

2. The comfort and health of the people working on this project will not be affected. Environmentally friendly products, like paints and other finishes, will not badly affect the people inside the store. Good lighting will not create head-aches, but will enhance the movement and feeling of both the sales staff and customers.

3. And last but not the least, is better profit. The client saves money due to the efficient products used inside the store. Efficiency means less maintenance and less energy use. Healthy staff reduces absenteeism and sickness, and happy customers will buy more.

USGBC – LEED Certification for Retail Projects

To achieve this certification, the retail project must get the desired points for different criteria.

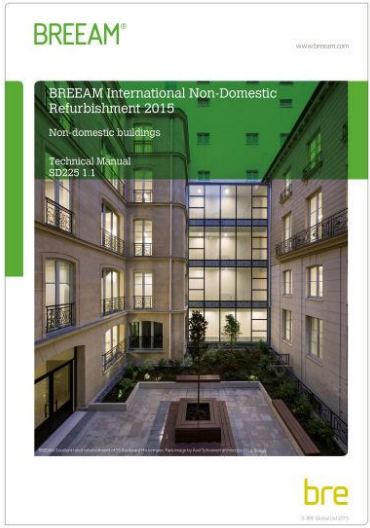
The intention of this LEED certification in terms of interior lighting is to promote occupants' productivity, comfort, and well-being by providing high-quality lighting, while reducing waste and energy consumption.

To know more about this LEED certification, please check the website: http://www.usgbc.org/credits/retail---new-construction/v4

BREEAM International Refurbishment and Fit-out Technical Standard

The benefits of this BREEAM certification are reducing running costs, providing a healthy place, protecting the environment, and getting more profit through socially responsible design. It is very similar to the LEED certification; the only difference is in the checklist for achieving the goals.

To know more about this BREEAM certification, please check the website: http://www.breeam.com/refurbishment-and-fit-out

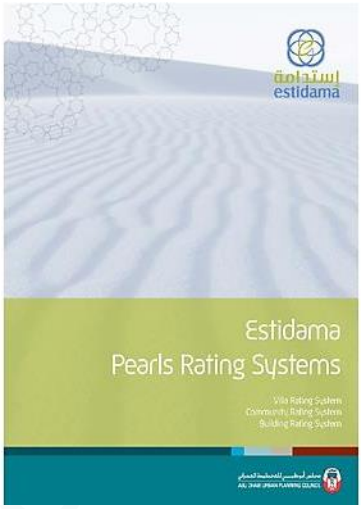


BREEAM®

ESTIDAMA – Pearl Rating System

This sustainability rating system was initiated by the Abu Dhabi government. Based in the hot desert land, the use of resources was the main consideration for this certification starting by focusing mainly on reducing energy use and maximizing the use of potable water.

To know more about this ESTIDAMA Pearl Rating System, please check the website: http://estidama.upc.gov.ae/pearl-rating-system-v10/pearl-building-rating-system.aspx?lang=



Chapter

4

Types of Lighting in Retail Shops

You will appreciate architecture through its light and shadow. - Nelca Roco

There are four types of lighting in retail shops. These are: general or ambient lighting, task lighting, accent lighting, and decorative lighting. These four lighting types if all used in one design, will create a better retail environment. A combination of two will give just the basic, and one type will be boring. Therefore, it is better to play and apply these four types to achieve the most exciting place to shop. We will discuss these four types one by one.

1. General/Ambient Lighting
2. Task Lighting
3. Accent Lighting
4. Decorative Lighting

Each of these types has a different role to play. Branding may dictate if all of these four types will be used or if one or a combination of two will suffice. You may want to read this article from SLE Smart Lighting for retail shops.

General/Ambient Lighting

General or Ambient lighting is the overall light inside the retail shop. If this is the only lighting type used, the effect is uniform and bland, with no emphasis at all. This is lighting that lights the whole area fairly evenly, without highlighting any special merchandise. This type is very common in budget retail shops.

The main purpose of general lighting is to guide the customers inside the retail shop to examine the merchandise. For the retail staff, it will help them complete the sale and perform their other duties before and after the shop's opening hours.

We can achieve this general lighting by using fluorescent lights distributed evenly in the ceiling layout. For dramatic general lighting, we can achieve it using cove lights either in ceiling and walls, or from spill light coming from the track lights.

As per our previous discussion regarding overall uniformity, this is where general lighting sits. General lighting (if used independently) gives (most of the time) better uniformity.

Below are some sample images of general lighting application.

The first two sample images show general lighting using 60 x60 recessed fittings. This is the easiest way to achieve a uniform lighting effect. While the two sample images below used recessed downlights. Some downlights are adjustable, which is advantageous in terms of flexibility. Sometimes the gondola or

highlighted merchandise is being moved from one place to another. Using adjustable downlights will fit this scenario.

General lighting creates a symmetrical installation in the ceiling, making it look clean and organized. This is also ideal for a retail shop that has low ceilings and plain design.

Task Lighting

Task lighting is specific lighting that focuses on helping the sales staff do their job. This is commonly seen at the cash counter. This type of lighting is very important because this is where the customers finalize transactions and complete sales.

There is only one important role for task lighting and that is to help people perform their job. Sales staff must successfully do the transaction without mistakes, and high illumination is necessary to achieve that. Providing specific light for this area is a must. Providing pendant lights or decorative spotlights above the cash counter is the best way to do this. Using this luminaire will also add significance to the area.

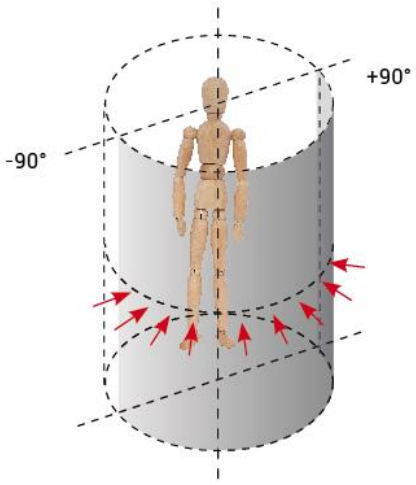
It is not only a high level of illumination that is necessary in this area, but also good color rendering because this is where the customer has the final look and decision making happens.

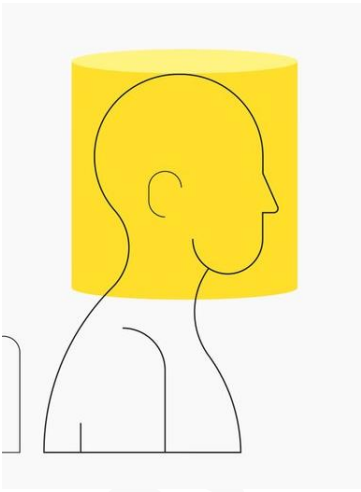
This Nike store used industrial design pendant lights. The design of the luminaire fits with the architectural style of the store. The cash counter looks significant compared with the rest of the area because of its different luminaire design (track lights are used over the rest of the store).

Below is another example of a cash counter that uses decorative pendant lights to perform the task.

This last example image uses track lights for cash counter instead of the common pendant light. Looking at the image, we can easily see that there is enough light on the cash counter top.

Task lights also help provide a good cylindrical illuminance to show the friendly faces of the sales staff. This cylindrical illuminance will make the customers feel more comfortable.





Accent Lighting

Accent lighting is the main character in the retail application. It is designed to provide additional illuminance on some areas, so as to

emphasize specific items of merchandise and to provide meaningful variations in brightness and shadow throughout the store.

Whatever the form of accent lighting, some flexibility is required. This is because the nature and direction will depend on the merchandise being highlighted.

Most big brands prefer to use solely accent lighting. This is to create a sophisticated intimate atmosphere; focusing on small collections of merchandise and leaving the other areas dark, lighted only with spill lights.

Accent lighting must have good color rendering. The main role of accent lighting is to highlight the color, design and texture of the merchandise. It is a spotlight creating dramatic effects on every object it focuses on.

Accent lighting can be achieved using track lights, spotlights, pendant lights and even built-in Shelf lights. Below are some images showing accent lighting design.

Decorative Lighting

Decorative lighting is more about its aesthetic look. Although it may also function as general or accent lighting, it is most often used to enhance the appearance of retail shops. Decorative lighting can also be used as a store's brand image.

The best example for this is how Dolce & Gabbana use chandelier in all their boutiques to articulate elegance and high-fashion, while other retail shops use modern pendant light systems to convey a fun and trendy atmosphere, like the images below.

Decorative lighting can also contribute to a feeling of hospitality and comfort, putting shoppers at ease and encouraging a longer visit. Decorative lighting elements may include pendants, sconces, chandeliers, and lighted signage or graphics.

Decorative lighting doesn't require any lux level or glare limitations. It is mostly creating a sparkling effect inside the store. But most of the time, it greatly helps achieve the general lighting requirements.

Below are some examples of decorative lighting.

Chapter

5

Three Ways to Light a Retail Shop

Light is the invisible hero behind sparkling objects. – Nelca Roco

Lighting a retail shop may seem a little complicated, especially if you are dealing with sophisticated clients. But, if you get familiar with the brand or product they are selling, you can easily categorize this kind of shop by how you will approach the lighting design. First, look at the basic idea of what is it they are trying to convey. Then, from there, you can analyze the ways to do it. For a start, try these three basic ways to light a retail shop:

1. Common
2. Formal
3. Dramatic

Do you remember the Light Effect topic in Chapter 3? That is so much connected to this. These three ways describe how the luminaires will be used and arranged, and emphasize the exact

lighting effect to be produced. Sometimes, these ways are also connected to the value of the shop and the value of what they are selling.

You may think that the **Common** way is usually used for the low budget shops and the **Dramatic** way is for exclusive ones. Today, it is not always the case. There are big brands now that prefer to have even illumination and clean arrangement of luminaires in the ceiling.

When you talk to your client, it is really important to understand their ideas of how the boutique will look like. If their ideas are vague or their understanding of lighting is very limited, then you can discuss these ways.

Common

The Common way of lighting a retail shop is by using one or two types of luminaires. The arrangement is typical and the lighting level is uniform in all areas. We can say that Common way is like a general lighting style.

The lighting design calculation aims to give better overall uniformity and enough lux level. Luminaire selection is typically downlights or a combination with another type.

The lighting objective is to brighten all the areas to encourage customers to feel at ease when entering the premises.

Watch this video tutorial on how to light a small retail shop using common way.

Formal

The Formal way mostly emphasizes the formality of the space. The selection of luminaire is exquisite, but not fancy, in design.

Luminaires and light sources blend with the aesthetic design of the interior and arrangement of the merchandise. There is a clean arrangement of the luminaires. There will be one color of lamp used, and if it is 4000K, then the rest must also be 4000K. CRI must be high to show the crisp line of fabric and show the true color and texture of merchandise.

Light effect is a combination of diffuse and spots. Uniform horizontal illumination is a requirement for the general area, while vertical illumination is a must for shelves and gondolas.

Below are some images of formal design of retail shops. Notice the arrangement of luminaire and architectural integration of lights both in walls and ceiling.

Dramatic

The Dramatic way, on the other hand, is by using the luminaires as part of the interior design. The use of fancy design luminaires and spotlights are evident. The overall uniformity (oU) is not part of lighting design calculation, as long as there is emphasis on the key merchandise. These shops are either too intimidating or too fancy to look at.

There are three or more types of luminaires used. Most of them are integrated to the architectural finishes, others are hanging or mounted all over the place.

Read this blog of Alan Tulla to know more of the ways of lighting a retail shop.

Chapter

6

What is Limbic® Lighting?

Light defines zones and boundaries. – Light & Architecture

Limbic® Lighting is a study done by the Zumtobel Group, in cooperation with the consulting firm Gruppe Nymphenburg, to identify the attitude and classification of each customer. Based on this study, Zumtobel was able to identify three different target groups which respond differently to various lighting scenes. The effectiveness of light is closely related to the buying motives of the customers. Using the results of this study, it is possible to increase retail profit by up to 10%. This video  will tell us how Gerry Weber brand increased their sales using this theory in their shop.

These customers have been divided into three groups, these are:

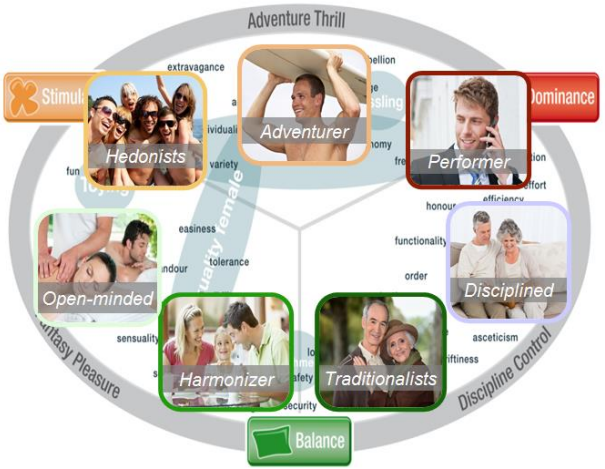
1. Balance
2. Stimulance
3. Dominance

The Application Study

ZUMTOBEL

Limbic® by Group Nymphenburg

- **95%** of our decisions are based on emotions
- Human motive & value space results in 7 value-dimensions-cluster of shopper types
- Different retail brands targeting different shopper types



Limbic® Lighting

- Consumer motivation and decision-based model
- Scientific & fully applicable to retail lighting

Balance

This first group is people looking for harmony and relaxation (Harmonisers, Traditionalists, Open-minded). As its name might imply, this group prefers a balance between ambience and accent lighting.

This is the largest target group consisting of quiet, harmony-loving individuals, showing particularly positive responses to moderate accent lighting. The lighting character for this group includes:

1. Ambient dominated by decent, soft contrasts by mixture of medium spot/flood accent beams, linear cove and vertical lighting
2. Moderate accent lighting by medium flood beams
3. Perimeter lighting by asymmetric vertical flood and completed by spotlights on demand
4. Standard average illuminance 800 lux on horizontal level
5. Soft integrated accent lighting using flood beams

6. Warm white (3000K) ambient light
7. Vertical activation by soft accent lighting from mix of accent and flood beams for perimeter lighting using asymmetric vertical flood and spot lights.
8. The vertical surface steps out of the low average illumination in the space decently.

See the images below for an example of Balance design in a retail shop.




Stimulance

This second group is unconventional people, also known as (Hedonists, Adventurers). This group includes adventurous and pleasure-seeking personalities. They respond better to low levels of ambient lighting and noticeable accent lighting on merchandise.

This group comprises of people who are fun-loving Hedonists and risk-loving Adventurers. Hedonists, especially, get bored quickly; they need variety and challenges in their lives. Lighting scenarios should facilitate a positive state of relaxation, but still keep a certain level of stimulance to avoid boring the target group. Here, for instance, scenarios offering high contrasts, with a reduced horizontal level of general lighting, will prove beneficial.

The lighting character for this group includes:

1. Ambient dominated by contrasts - by high accent and vertical light share using tight spot accent beams and decorative ambient lighting
2. Accent lighting by spot to medium floods
3. Perimeter lighting by asymmetric vertical flood and accentuation strengthened by spot lights
4. Low average illuminance 500 lux on horizontal
5. Integrated accent lighting for shelves, niches
6. Neutral white (>4000K) ambient light

7. Contrast driven vertical activation by mix of accent and flood beams for perimeter lighting from asymmetric vertical flood and spot lights with high luminous intensity
8. The vertical surface steps out of the low average illumination in the space

See the images below for an example of Stimulance design in a retail shop.

Dominance

This third group is Critical people (Performers, Disciplinarians). They are high-performing and disciplinarian personalities. This group has the opposite response to Stimulance, since they prefer high levels of ambient lighting and little accent lighting.

This group is characterized by the skeptics among the Limbic® Types, in other words, those who are easily unsatisfied and turn away from situations that do not meet their expectations. This, basically skeptical, target group is sensitive to unbalanced lighting concepts and is best loaded with positive emotions through well-balanced, moderate lighting effects.

The lighting character for this group includes:

1. Homogenous ambient - uniformity by high diffuse horizontal light share using wide accent beams, downlights, floodlights and cove
2. Accent lighting by medium to wide flood beams
3. Main accentuation by uniform perimeter lighting by asymmetric vertical flood lights
4. Relative high average illuminance of 1200 lx
5. Uniform illuminated shelves, niches
6. Neutral white (3500-4000K) ambient light

7. Vertical activation by uniform perimeter lighting, free from dark spots from asymmetric vertical flood lights for the complete vertical surface with high luminous intensity.

See the images below for an example of Stimulance design in a retail shop.

To know more about this Limbic® Lighting study, check the PDF white paper here:

Now that we know the Limbic® Lighting Theory, the best example to apply this is probably sportswear shops, where we can identify the target group as Stimulance, while for corporate suit boutiques the target will be the Dominance group. Customers in stores selling basic clothing for children and maternity might belong to the Balance group.

You can use this study as a guide when designing your retail shop projects. You must explain this lighting theory to your client and help them identify the character of the target customers of their store. They may not know it until now, it will be your best chance to impress your client! Good-luck!

Click this link to proceed with the video  presentation about Limbic® lighting, and this video for the tutorial on how to apply this theory in lighting design using Dialux evo software.

There is one best website link to play these 3 lighting schemes online and you will find it here in this link. You may also download this software called VIVALDI to use for your client presentation.

See this link for the sample video  about VIVALDI.

I will create a separate video tutorial on how to use VIVALDI, so watch out for this one.

Chapter

7

Types of Luminaires for Retail Shop

Light plays a central role in the design of the visual environment. – Unknown

Luminaire types for retail shops must be properly identified. Not knowing the right fixtures will lead to incorrect calculations and designs. CRI, CCT, beam optics, aesthetics, mounting, maintenance, and other accessories are some of the consideration when selecting the proper luminaires for a retail shop lighting design.

The way you want to highlight the merchandise and illuminate the whole space will affect how you choose the right fitting. Some retail brands have pre-selected luminaires, all you have to do is play with the aiming and beam optics.

The selection sometimes depends on the client's budget and restrictions inside the store. As an example, you cannot use pendants or suspended tracks in a low ceiling shop.

Luminaire also depends on the ceiling layout. Cove light and other ceiling decoration must match with the light fittings to be used. So, it is important to check the ceiling design before selecting the luminaire types.

The most common types of luminaires use in the retail shops are:

1. Track Lights
2. Downlights
3. Wall Washers
4. Shelf Lights
5. Pendant Lights
6. Cove Lights
7. Back Lit
8. Decorative Lights

Track Lights

Track lights can be mounted recessed, surface or suspended. This is the most flexible type of luminaire in retail shops. Gondolas and shelves are sometimes moved from one place to another, and using track lighting is the best solution for these changes. Track lights can not only be aimed flexibly, they are also easy to install and maintain.

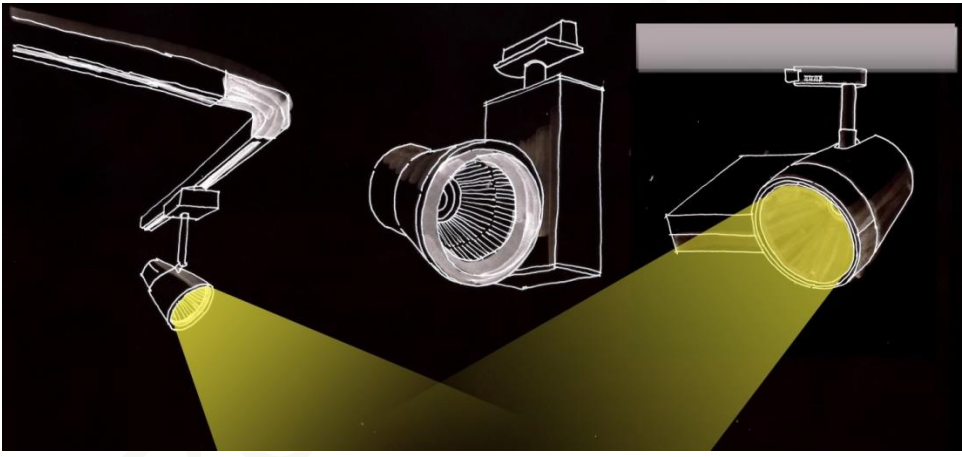
The best part of using a track light is that it can be aimed directly at the display area - focusing people's attention on the merchandize.

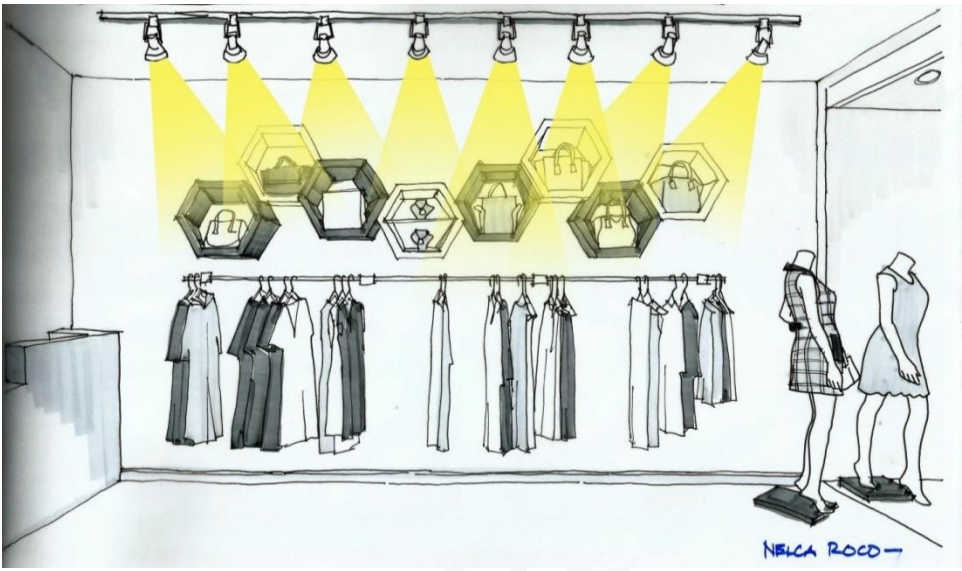
Beam optics played a vital role in track lights. The narrow beam and wide beam (or some manufacturers call it spot and flood beam)

can be used according to its purpose. Flood beam can be used for general lighting or for wide areas to be highlighted, while spot beam can be used to focus one item and highlight it deliberately.

The first rule of using track lights is to focus the beam onto the merchandise from the viewer's point of view. Improper use of track lights may cause glare, which is a big "no-no" in a retail shop.

Check these gorgeous track lights for inspirations.





Check other lighting manufacturers to see how their best track lights have been promoted to be the most effective luminaire for retail shops. From there, you will see its advantages compared with the rest. Another thing is to check is the retail application projects of these brands. It will inspire you to use track lights properly. For more information, see this Track Lighting 101. Also, Check this video to see track lights use in retail shops.

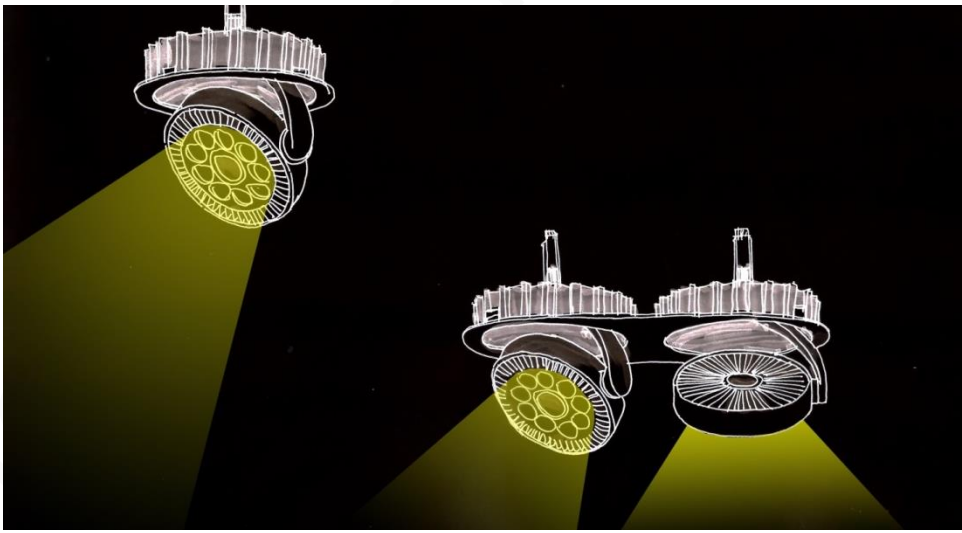
Downlights

Downlights are the most common luminaire, and not only for retail shop applications. Downlights that are adjustable are another great solution, just like track lights.

Adjustable downlights are not that flexible, but they are doable. You can also aim them towards merchandise, but they may be limited as

far as spacing and sometimes tilting angle goes. Also, they may not work in high ceiling rooms. But the main advantage of adjustable downlights is the clean arrangement in the ceiling. A sophisticated retail brand may require a neat and organized ceiling design and most of the time, adjustable downlights are the only luminaires which can comply.

Downlights can be mounted in the ceiling as well as inside shelving. They can be single, twin/double, or triple gimbals that can be aimed in different directions. The option of spot and flood beam is also available for these adjustable and fixed downlights. As always, make sure you select the perfect beam optics for your display merchandise. Check this product for more inspiration.



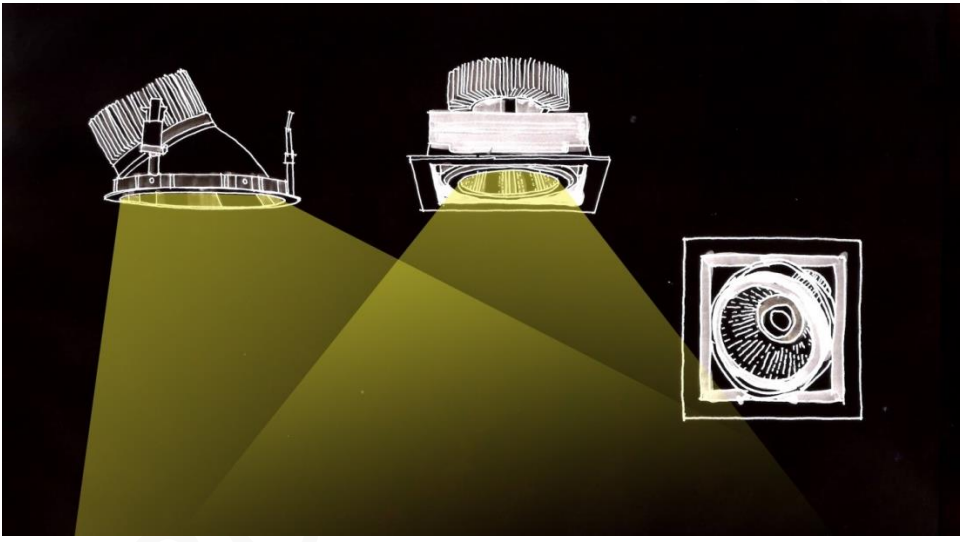
The shape of downlights varies from round to square. Round shapes are easy to lay-out, because you don't need to align the luminaire from edge to edge compare with square or rectangular.

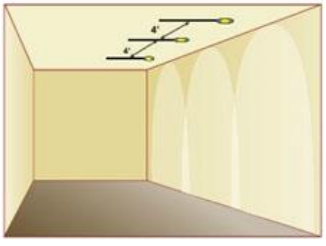
Architects and interior designers are very strict with this alignment, which is sometimes very frustrating for installers. Well, we need to make sure that the installer has an easy life too, not only the client.

There are also downlights that are trimless. You need to double check if it is necessary to use a trimless downlight or one with a bezel. Considering the color of the trim or bezel is also crucial because it must blend to the color pallet of the ceiling. See this video to find out how to select downlight for retail shop.

Wall Washers

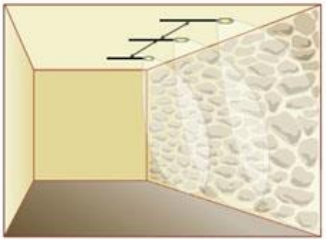
Wall Washers are the best solution for vertical illuminance. Having a bright wall will make the retail shop seem wider and bigger. Bright walls will also encourage customers to enter the shop. It gives a comforting effect to the eye. Wall Washers can be downlights, linear lights or cove lights.





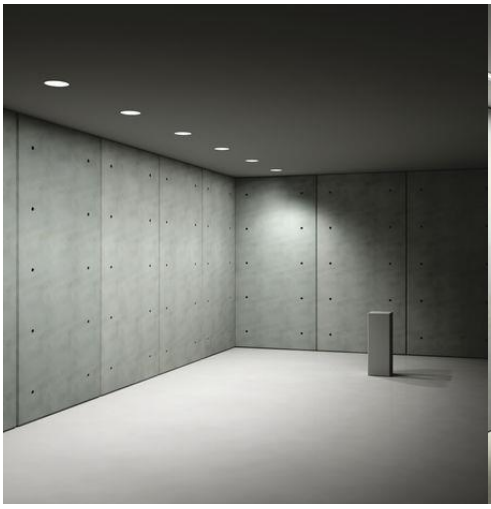
Light Scallops

Light scallop is an effect created when the recessed fixture is placed closer to the wall resulting in a more concentrated and tighter scallop. Scallop light effects are often a part of the lighting plan for added drama, however they can be inadvertently created if fixture placement is not properly calculated.



Grazing

For dramatic effect on textured surfaces such as stucco, stone or brick, place fixtures 6 to 12 inches away from the wall. Grazing is not recommended on smooth surfaces as surface imperfections will be exaggerated.



To get a uniform effect, we need to make sure that the distance of the luminaire from the wall is properly analyzed. There may be a hindrance with the spacing, but it is very important to solve it during the design stage, otherwise the wall washing will look annoying because the customer's eye will mostly be directed to the vertical light not to the horizontal.

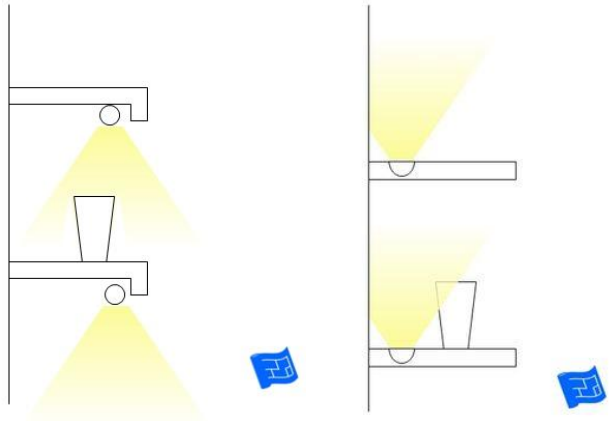
Wall Washers add to the general lighting. Bright rooms give a positive feeling. This type of luminaire is very important in a retail shop where uniform light is required. Check these sample wall-washer luminaires.

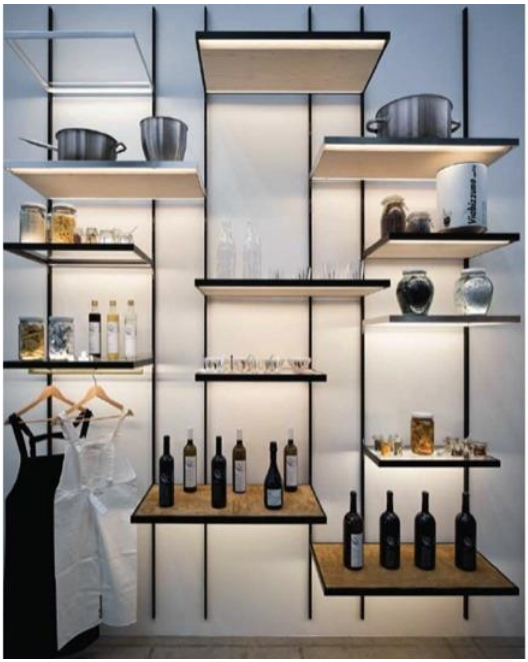
Check this video to see how the wall-washing must be done in retail shops. We will show you which luminaire can perform this function.

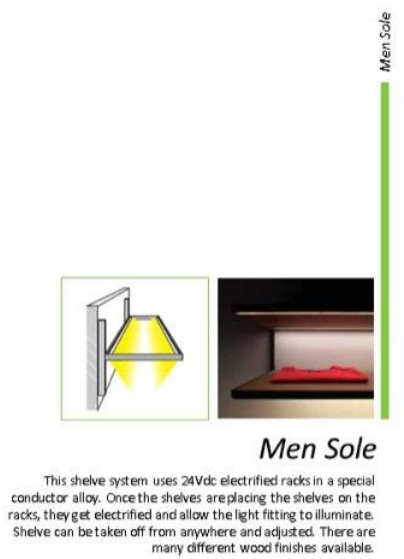
Shelf Lights

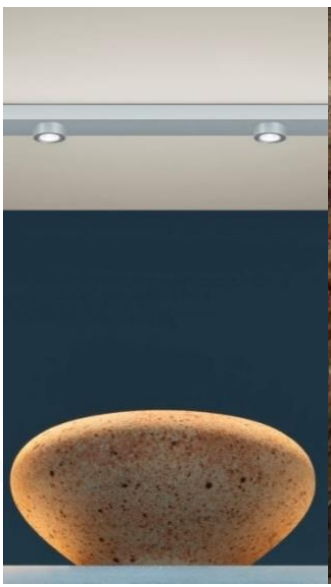
Shelf lights are usually integrated into shelves. They are used to highlight the merchandise closely. The most common shelf lights are strip LEDs or small pin lights. Some furniture manufacturers include them in their modules. But most retail lighting manufacturers have their owned range of products for this lighting solution.

Sally Storey will teach us her techniques about shelf lighting tips in her blogs. Let's check it out!







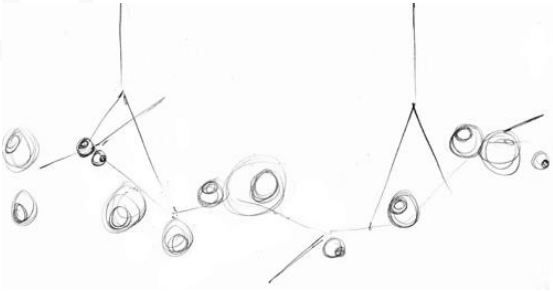


Check this video tutorial to know more about shelf lighting techniques, and these shelf-light sample luminaires.

Pendant Lights

Pendant lights can be used for general lighting or functional lighting. High ceiling retail shops prefer to use industrial design suspended luminaires. Open ceiling retail shops prefer to use them as well.

You may notice that the usual fitting above the cash counter is suspended. This is to show that this area has an exclusive function. It also gives emphasis on the importance of the space.



The Branching Burst Chandelier, sketched by Lindsey Adelman.

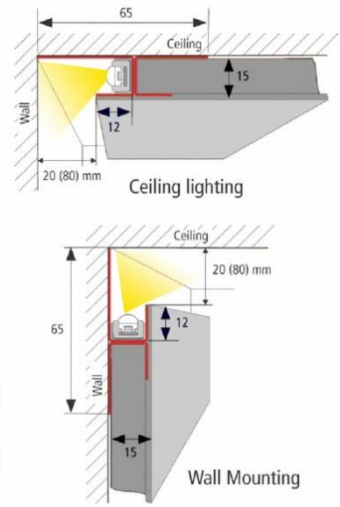
Check this video tutorial to know more about pendant lighting techniques. And see these gorgeous pendant luminaires suitable for retail shops.

Cove Lights

Cove lights create soft illumination. This not only helps the general lighting level, but also it produces a different effect on emotions by highlighting the edges of the space.

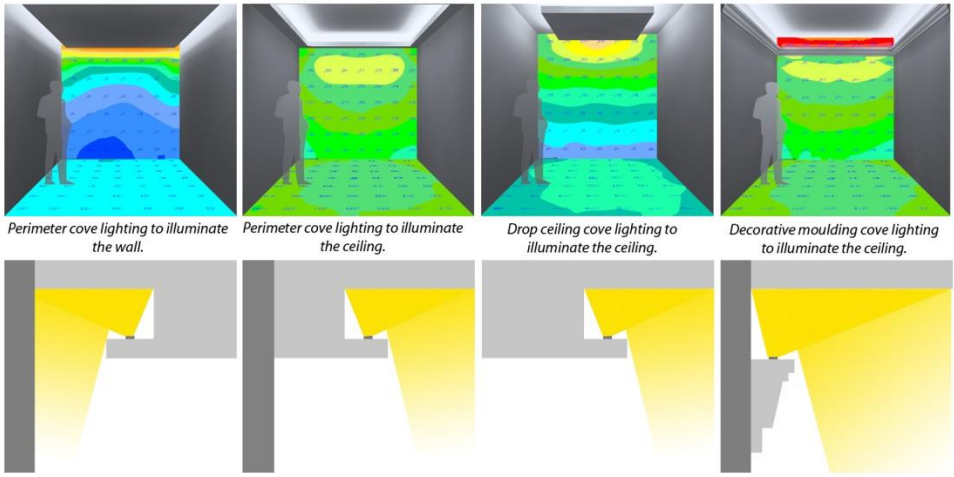
Cove lights can be installed in ceilings, walls or shelves. The most common lamps used in cove lighting are linear fluorescent tubes, neon lights and LEDs. The installation varies depending on the cove design.

Due to the efficiency of LEDs, these are now widely used for cove lighting. They also lessen the maintenance aspect because of their long life.



There are many ways to create cove lighting inside the retail shop. One is using perimeter cove lighting to illuminate the wall, two is to use the same perimeter cove lighting but highlighting the ceiling,

three is to use drop ceiling to create cove lighting illuminating the ceiling, and last is to use decorative molding or any detail on the wall to hide the flexible LED and illuminate both the wall and ceiling.



The images below show some of the cove lighting techniques. This cove lighting example is used for general lighting and wall-washing.

Check this video tutorial to know more about cove lighting techniques. The video tutorial will discuss on how to layout the LEDs and flourescent tubes in the calculation. We will also tell you where you can download the IES files for LED strips.

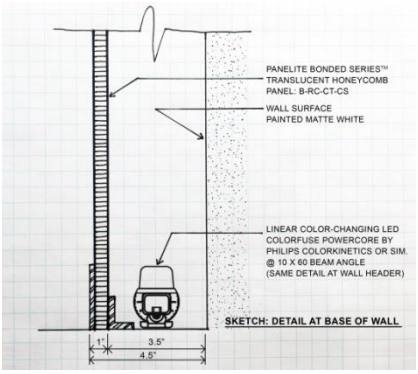
Back Lit

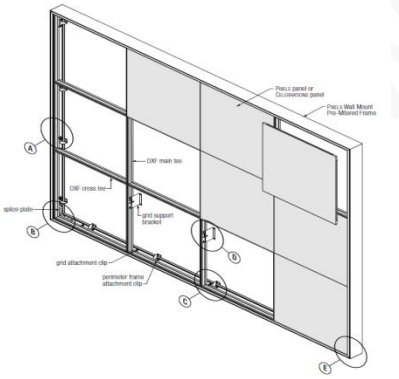
Back lit is another best way to enhance the overall ambience of the retail shop. It gives uniform effect and it widens the appearance of the room.

Most back -lit fixtures are used for advertisements and signage, but with the evolution of LED, it is becoming part of the lighting solution for overall illumination.

In working the lighting design calculation, it is necessary to understand the transmittance and reflection factor of the panel to be

used. The spacing and the distance of the LED to the panel must also be checked, otherwise the LED light dots will be visible (which is not good because our main requirement for back -lit is to have soft – diffuse, uniform illumination).





Back lit can be part of the module or built -in to the wall. It is also sometimes part of the furniture.

Check this video tutorial to find out more about back lit design techniques. This tutorial will teach you how to edit the transmittance and reflection factor of the panel, and to lay out the LED inside the back -lit module or wall.

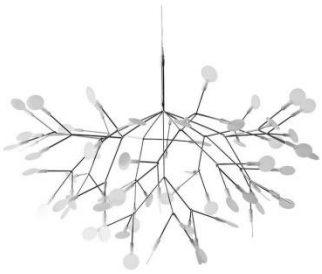
Decorative Lights

Decorative lights are the fancy luminaires used in the retail shop. They can be suspended, wall mounted or floor standing.

Some big retail brands use decorative lights as part of their branding. Decorative lights attract the customers' attention, encouraging them to look and linger more.

Most decorative lights do not have IES or photometric files. That includes chandeliers and other suspended lights. Very few manufacturers produce them. If they do, most of the time the 3D of the photometric file looks like a box or cylinder.

Check this video tutorial to find out how to use decorative lights in the lighting calculations without photometric files. I am sure you are now curious about how we will do it. You will also find out in this tutorial the details of where you can get the best decorative luminaires with photometric files. Again, I am not promoting any brand here. Check these gorgeous decorative lights as well.



The image below shows some example of decorative fittings used in retail shops. Most of these decorative fittings are suspended above the most important merchandise or area.

We're done selecting the luminaires! Do you think you are confident now to choose or suggest which fittings are the best solutions for your retail shop? I suggest you always get -in -touch with lighting manufacturers for retail shops to keep up to date with the latest trends. You may get your free lunch as well!

Chapter

8

Lighting Techniques

The architecture, people and objects are all made visible by the lighting. -

We just finished the theory of retail lighting design. Congratulations! You reached this far! This is the most exciting part of this book. This is where you will learn the basic techniques of how to do the lighting design for retail shops. We will discuss the different areas inside the retail shop and one by one we will give you the techniques for lighting it.

For every area, there will be links to video tutorials. I am sure you will love it because this is how the hands-on tutorial goes.

The areas that we will discuss are:

1. Window Display
2. Entrance
3. Gondola or Display Case
4. Shelves and Racks
5. Cash Counter
6. Spot Merchandise

7. Sales Floor

8. Fitting Room

9. Stock Room

To get the complete set of videos for these retail lighting tutorials, please click this link. Enjoy!

Window Display

The window display is the most important part of a retail shop, because this is where we need to catch the attention of customers. This is the first point of sales. The goal of the display window is to stand - out and entice customers to enter the shop. Therefore, a dynamic and encouraging display window is a must.

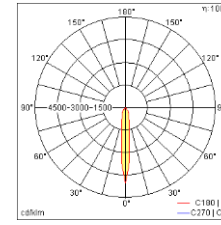
There are many ways to light display windows. It sometimes depends on the occasion. That is why it is very important to have a flexible lighting solution (both in color and mounting) in this area.

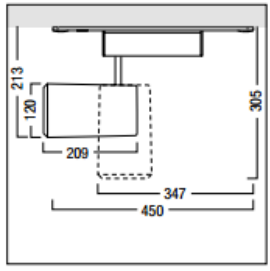
Lighting Techniques

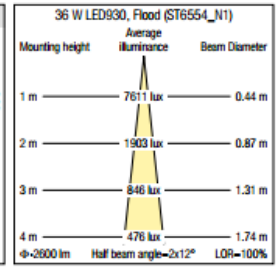
To light window displays, we will be using what we learned in previous chapters, the accent lighting. Accent lighting can be achieved using mostly by track lights. Spotlights and pendant lights can also be used as an alternative. Different light colors are also beneficial to play with depending on the kind of display and the season.

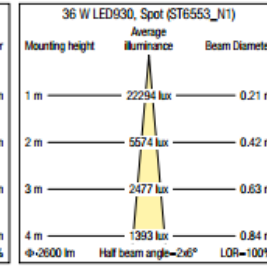
To effectively create accent lighting in a display window, we need to apply the concept of stage lighting where there is key light, fill light, and back light. Sometimes uplighting helps to create a more dramatic effect.

Key light creates hard shadows and intense focus on the display. It highlights the main focus of attraction. We can use narrow beam spotlights for key light.

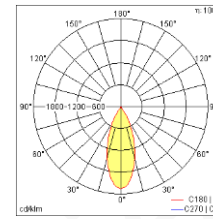


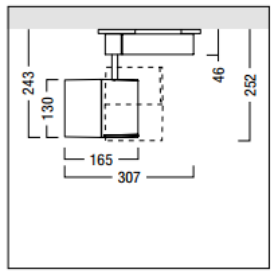


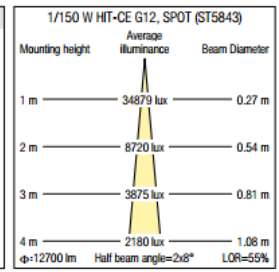


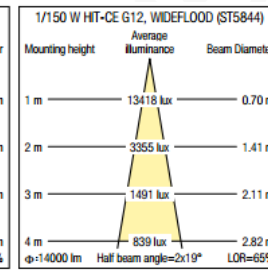


Fill light, on the other hand, is soft light aimed from another direction to soften the shadows and give additional light from an area that has been excluded. Wide beam is the applicable optic for fill light.

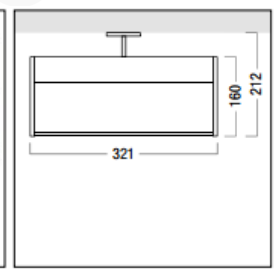


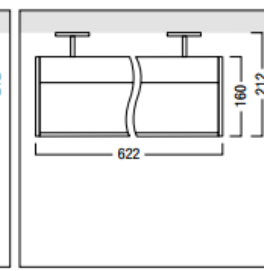


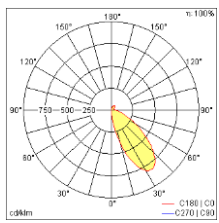




Back light is the lighting from behind to accentuate the size and shape of the display. Downlights or any wall -washer will work for back light.

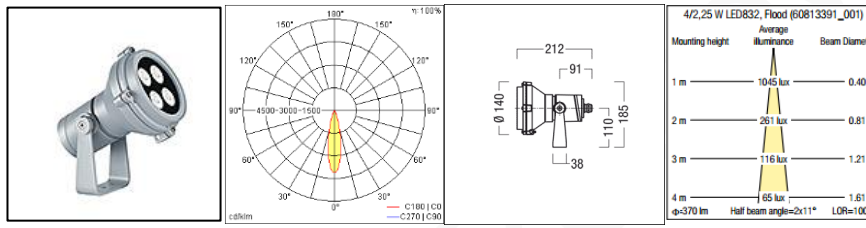






Uplight is mostly use for heavy drama. It must be carefully used because it gives different effects on the display, which may lead to the wrong impression. Uplight can create scary effect on the face of the mannequin.

Floor recessed or surface mounted small floodlight or linear light can be used for uplight.



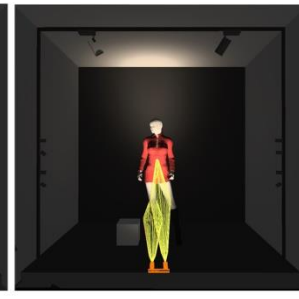
See the image below for a sample display window with lights. Here, you will see the different combinations of window display lights.

Key Light - Spot beam

Fill Light - Flood beam

Fill Light - Flood beam from sides

Fill Light - Flood beam from sides

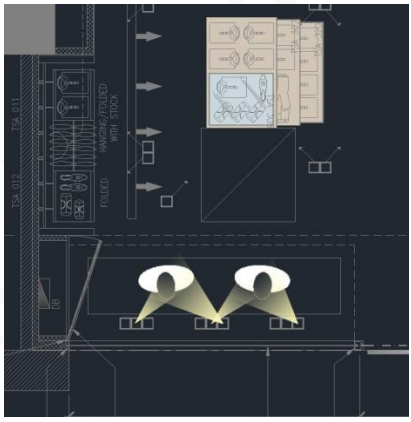


Uplight - Flood beam

Back Light - Wall washer

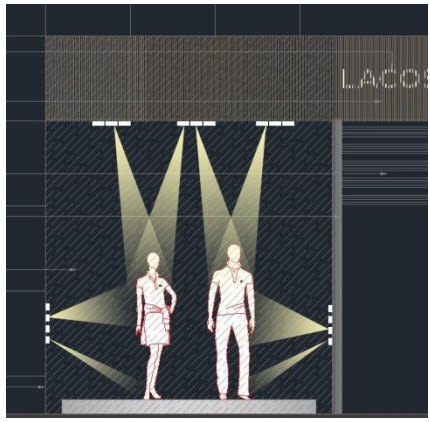
Four Techniques for retail shop display window:

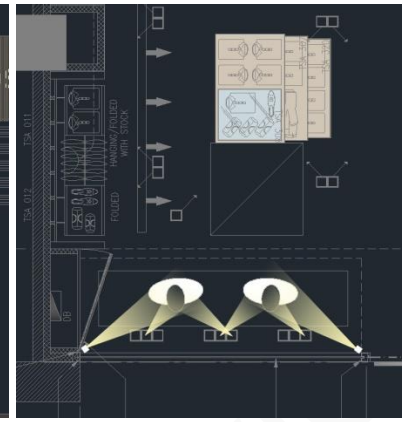
1. Basic Technique. This is a combination of two spotlights usually mounted on tracks. One will serve as Key Light and the other one is Fill Light. Key Light is the spot beam, most of the time rotated 45 degrees towards the side of the mannequin. While Fill Light is mounted on the other side to soften the shadows and create higher illumination in the background. Wide beam optic is preferable for Fill Light.

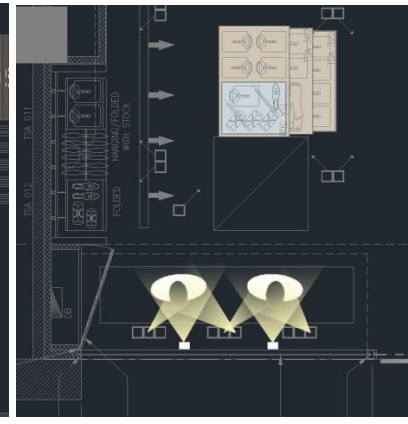


2. Advanced Technique. This uses a combination of Key Light, Fill Light from the side and Back light or wall washer to highlight the background. Key Light is a spot beam, Fill Light can also be a spot beam (but focusing on the lower side of the mannequin and other items on the display window), and wall washer can be a linear light to uniformly highlight the back panel.

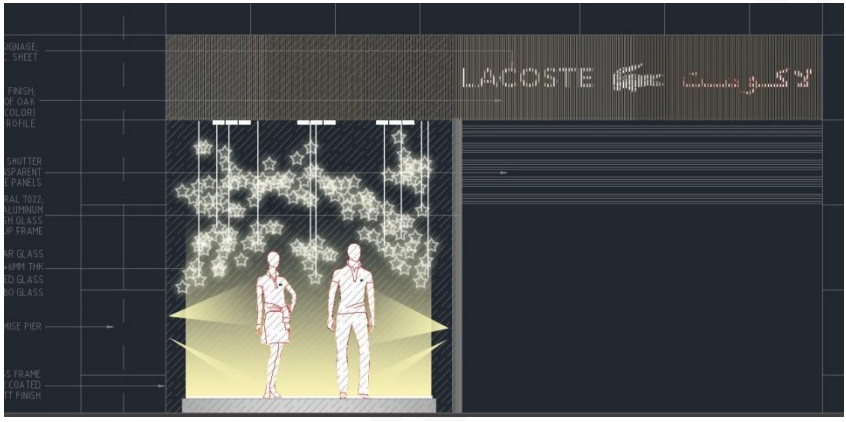
3. Dramatic Technique. This is famous for using a spotlight or floodlight from below. Dramatic technique is a combination of Key Light, Fill Light and spotlight from the ground level.

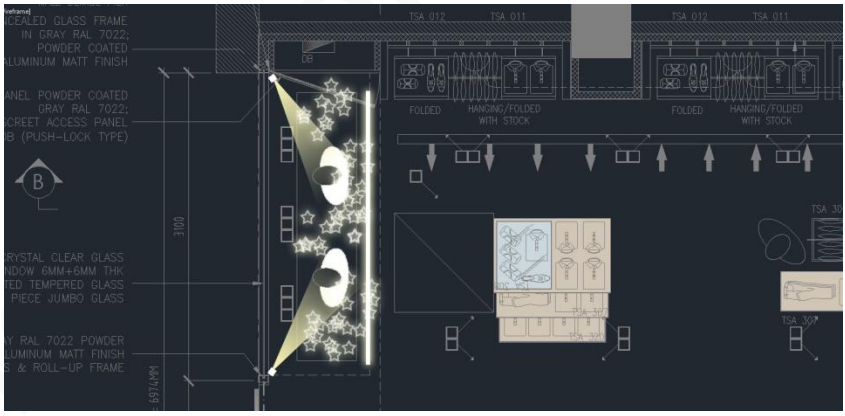



HANGING / FOLDED WITH STOCK
FOLDED


HANGING / FOLDED WITH STOCK
FOLDED

4. Occasional Technique. This is usually a basic technique with decorative lights combined. Decorative lights can be suspended, wall mounted or dynamic light. The main purpose of adding decorative lights is to emphasize the occasion, for example, Christmas lights during the Christmas season, or dynamic lights for Independence Day.





Here is another example of display windows using downlights instead of flexible track lights. Your judgment in lighting the display window will depend on the type of display and occasion. Always remember that the main goal is to catch the attention of passersby.

The display window above uses track lights hidden behind the glass frame as the key light, and linear recessed luminaires, both up and down, to act as wall-washers to fulfill the role of back light.

This next display window uses narrow beam spotlights aimed at specific parts of the display, and cove lights mounted in the floor to give low contrast between background and foreground. This display window is dramatic.

There are marketing studies on attracting the attention of passersby using light value. These are:

180 lx illuminance stops 5 percent of passers-by in their tracks;

1,200 lx produces a 20 percent response; and

2,000 lx catches the eye of 25 percent of passersby.

Therefore, the increase of illuminance will also increase the attraction.

Do you remember the ratio of accent lighting we discussed in Chapters 3 and 4? To draw the attention of passersby to merchandise, a 5:1 ratio is typically used as the minimum to create a significant visual effect, or five times the amount of light on the item compared with the surrounding area. Dark merchandise may require even more light to bring out detail. Higher ratios of 15:1 or even 30:1 are used for feature displays and, most of the time, adds sparkle to jewelry or crystal.

A display window is the best place to create light scene. Different seasons and occasions need different lighting solutions. Therefore, it is important to always offer a variety of lighting design to keep the window display continuously exciting.

If daylight and light scene are integrated to display window, make sure to incorporate lighting control. Not only will it save energy, but it will also reduce the lumen output of the luminaires during peak daylight hours.

Glare and heat might also become problems in display windows. Therefore, façade structural solutions are necessary to consider in fighting the excessive penetration of daylight.

So, let's go and check this video tutorial to learn the techniques on how to light window displays!

Entrance

Like the window display, this area is an important part of the retail shop because this is where we need to invite the customers and let them freely enter the shop. Entrance is the second point of sales.

Front entrance must make a statement and invites people in. A bright and open entrance will invite, fascinate, amuse and motivate

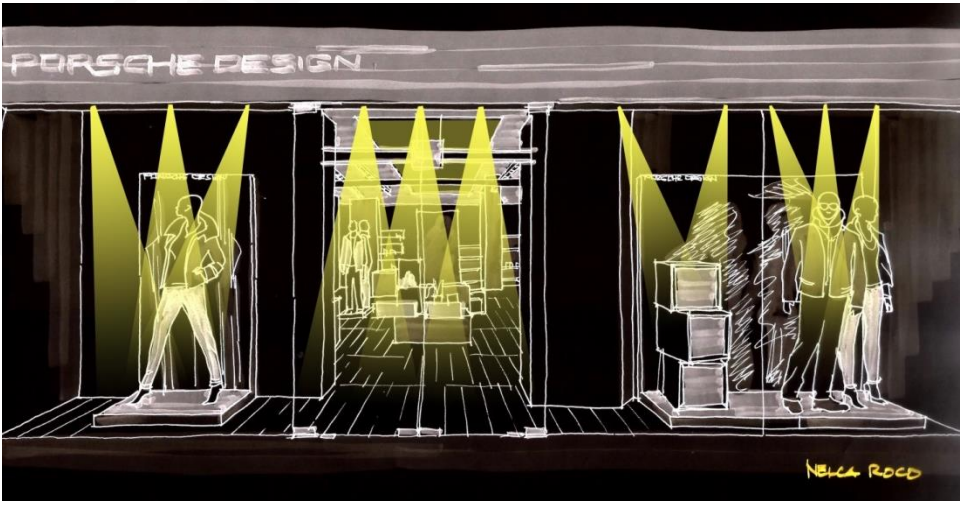
movement which, in turn creates a feeling of invitation to customers and make them excited to see what is inside.

Entrance light level must be 50 times higher than the selling area (1000 to 2000 lux is ideal). It must be open and accessible. The only hindrance in the entrance must be the thief sensor. No dangling lights or any obstructions. Customers must freely enter the premises without hesitation.

High powered downlights or spotlights are the usual luminaire at the entrance. Other catchy or unusual design of luminaire is also possible as long as it will not obstruct the entrance.

Glare is another consideration as we do not want the customers to feel uncomfortable at the beginning. A little sparkle is fine.

Lighting calculation at the entrance must be at the floor level. Add hemispherical calculation at 1.20m if you want to fulfill the CCTV lighting requirements.

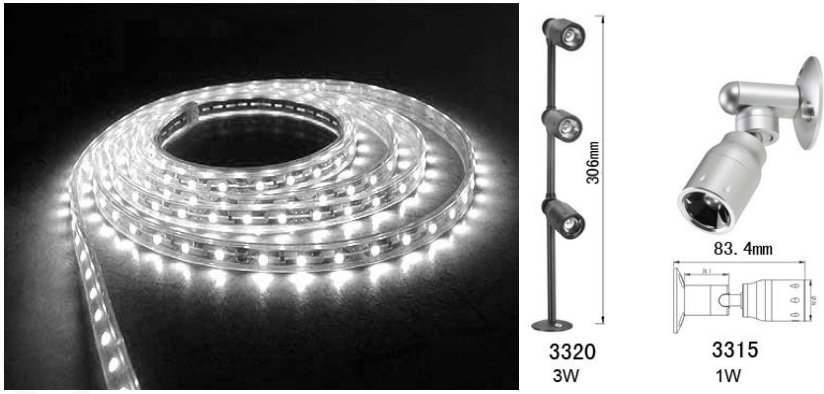


So, let's go and check this video tutorial to learn the techniques on how to light the retail shop entrance!

Gondola or Display Case

Gondolas or display cases has as option to have a built-in light or not. Most of the furniture manufacturer create a provision for built-in lights. This is beneficial for the contractor as they need to coordinate more if they are the one to put lights.

Meanwhile, most of the gondolas today become simple or minimalist in design. Some LED strips is not enough to give light to merchandise. Therefore, lighting from the surrounding is necessary to highlight gondolas.



Lighting gondolas can be done through track lights, adjustable downlights, or wall-washer lights.

Most of the gondolas are placed in the middle of the selling area, therefore, two directions of light is necessary to highlight both sides.

See sample images below showing gondolas and display cases.

So, let's go and check this video tutorial to learn the techniques on how to create gondolas using object extrusion, and to light it!

Shelves and Racks

Like gondolas and display cases, shelves and racks can be lighted built-in. But to get the better vertical illumination, it is still necessary to have extra lights in front from ceiling or from tracks. Shelves and racks can also be illuminated from the back to add contrast, and create a silhouette effect on the merchandise.

See sample images below for clothing shelves and racks.

So, let's go and check this video tutorial to learn the techniques on how to create shelves and racks from object extrusion or from 3DWarehouse and light them!

Cash Counter

Cash counter is the final encounter of the customers to sales staff. Lighting must help the staff to do their task, eliminate errors in giving change or punching the right item to cash register. This is also the last time that the customer will check the merchandise. Therefore, lighting must have the right level for reading, writing and checking colors and fabric. 500 lux with good color rendering (at least 80CRI) must achieve at the top of cash counter.

Suspended luminaire helps the cash counter to be easily recognize. Track light or downlight is also possible to use as long as the cash counter is brighter than the selling area.

See sample images below for cash counter lighting.

So, let's go now and check this video tutorial to learn the techniques on how to light cash counters!

Spot Merchandise

This area is the most important part of retail shop because this is where we need to catch the attention of the customers. This is the first point of sales. Lighting must be high to make this area stand out from the rest.

Decorative suspended luminaire will add attraction to this area. Spotlights with intensive beam from opposite direction are effective to catch attentions as well. This area is similar to display window, the only difference is customer can touch and take a closer look on the merchandise.

See the sample images below for the spot merchandise lighting.

So, let's go and check this video tutorial to learn the techniques on how to light merchandise!

Sales Floor

This is the area where over-all or general lighting is necessary. Lighting at sales area must help people move safely and freely. Lighting at sales floor can be from downlights, track lights, or cove lights. Some shops will just leave it to spill lights that are coming from merchandise lights. Remember the dramatic ratio? Dark area on the floor, but blast of light on the merchandise? That's it!

200 lux is enough light for the sales area. No color rendering is necessary. Other brands prefer to have even and bright illumination in the sales floor. That is to encourage customers to linger more.

Below are sample images for sales floor lighting.

So, let's go and check this video tutorial to learn the techniques on how to light sales floor!

Fitting Room

The fitting room or changing room is the most exciting part of the retail shop. This is the place where the true revelation happens. This is where the merchandise will truly be appreciated by the customer. According to Philips Lighting, there is a study that shows 60% of the decision making on whether to buy or not happens in the fitting room.

Therefore, we need to consider these things in lighting a fitting room.

1. True color but not so true – hahaha! I made these list because I read one blog that says fitting rooms must show that the customer is beautiful, but do not be too honest so that even the cellulite and gray hair are highlighted. Good CRI (80-90) is a must, but it should be properly placed where the overall look in the mirror will be fantastic. But, how are we going to do that? That is the next one.

2. Location of the light – The customer's eye goes directly towards the mirror. The light must be properly angled to highlight the body rendering. Placing the luminaire along the mirror is the best solution, either on the side or at the top of the mirror. Therefore, the usual one downlight installation in the fitting room is, in my opinion, a not so good solution.

3. Lighting control – As per our previous discussion, one of the main concerns right now is energy use. Using light sensors in the fitting room is the best way to conserve energy. We can turn off the light when nobody is using it. But make sure the sensor is working properly, because it may cause embarrassment to customers if it suddenly turns off while they are changing their clothes. One more thing, it should also not look like a blinking red dot as if it is a hidden camera. This video will explain you more.

Lighting control can also be used to give different light effects in different seasons or occasions. That can make the customers feeling special.

4. Selfie room – Let's not forget that the fitting room today is one of the famous places to take a selfie. Whether a young lady wants to immediately ask the opinion of a friend or wants to post it on social media. Therefore, enough light is necessary to capture these moments. 300 lux is, I think, enough to help smart phones get nice shots.

So, let's proceed now in our drawing room and see how we can apply these important considerations. Click the video link for our video tutorial.

Before we dive to our tutorials, let's take a look on the sample images for fitting rooms lighting below:

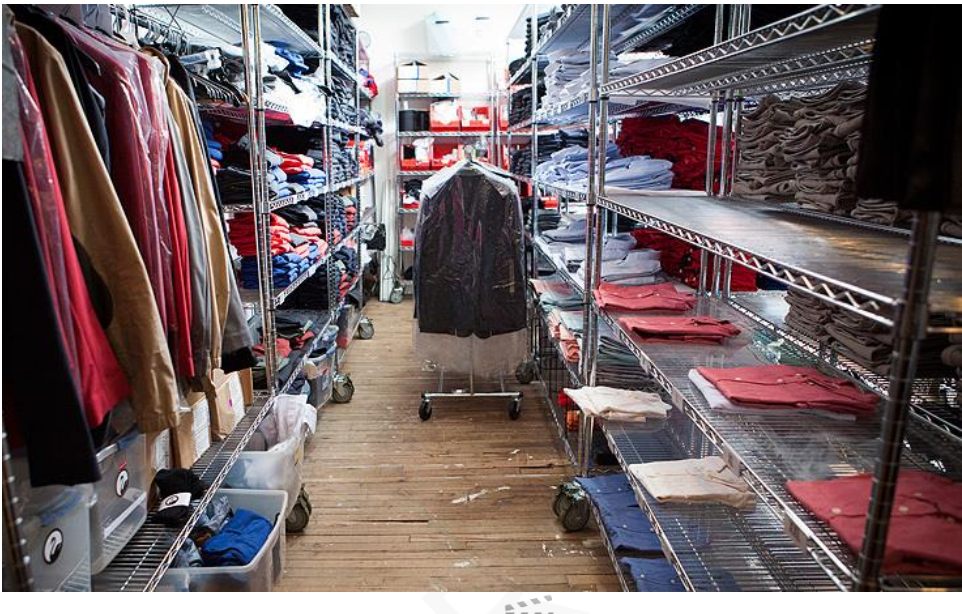
Stock Room

Stockroom is not accessible to the public, but lighting is this area must still be take into great consideration. The sales staff must have enough light to sort and find the stocks. Fail to give the right light will lead to mistakes and waste of time finding the items.

60 x 60 recessed luminaire or any IP Rated surface mounted fitting will suit to stockroom lighting to achieve at least 300 lux. There is no need for color rendering index, but luminaire efficiency is the best considerations.

Placing the luminaires along the alley of the shelving is very important to achieve both horizontal and vertical illumination.

Below is the sample image for stockroom lighting.



So, let's go and check this video tutorial to learn the techniques on how to light stockrooms for retail shop!

This is the end of this chapter. You can go back and review it over and over again with the free video tutorials. Practice in lighting design is the key to become the best lighting designer!

Chapter

9

Tools

It is the light that first enables what you see. – Archi & Light

There are tools that we need both in designing and in operation and maintenance for retail shops. These are:

1. Computer Software – Designing
2. Aiming Device – Installation
3. Lux Meter – Commissioning
4. Luminaires Manual – Maintenance

These tools are very important both in the beginning and at last stage of the project.

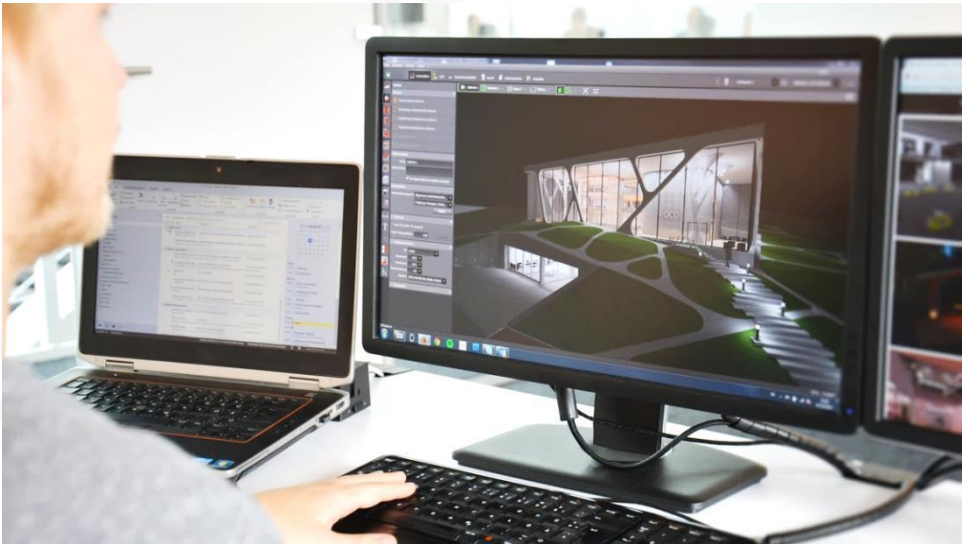
I am sure you are very much familiar with these tools, but some of these may not useful in your daily work. Anyhow, I would like to introduce these properly, so in case you encounter these in your work, you will have a better idea on how to use it.

Let us start on the basic one which is the most commonly used tools for lighting designers – the computer and its software. Specifically, lighting design software.

Computer Software

The computer and lighting design software will both the core in working with the lighting for retail shop. Computer is the hardware which must be powerful enough to render and calculate lighting design. Dialux and Dialux evo have specifications for computer to properly install these two softwares. For Dialux evo, this is the minimum computer specifications: CPU with SSE2-support, 4 GB RAM (min. 2GB), OpenGL 3.0 graphics card (1 GB RAM), Resolution min. 1024 x 768 px, Windows 7 (32/64 bit), Windows 8.1 (32/64 bit), Windows 10 (32/64 bit). See this link to find out the older version PC requirements for Dialux evo.

While for Dialux, the basic computer specification is much lower compare to evo due to its simplicity in application.



Later after this chapter, we will discuss the different softwares that the lighting designers must learn and use. It will not only Dialux evo

which will fulfill the whole lighting design. Other software are also necessary to complete the calculations.

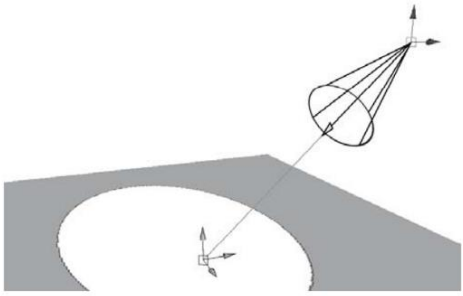
Prepare yourself because you need to learn at least three of these.

Aiming Devise

The aiming device can be anything with laser projection to target the specific location or object during the installation and aiming. This is very important specially if the lighting design has precise aiming point or tilting angle which needs to achieve.

This is one of the exciting part of the job of lighting designers. This is the time where you yourself do the lighting manually and physically. Being present during the installation of the luminaire is one of the fulfilling factor of lighting designers - to see your design in reality.

Below is the image of aiming device use for floodlights.



Lux Meter

Lux meter, oh the glorious lux meter! How can we check if the lux level is enough in a specific area? By using this small devise called lux meter.

We can only say that our design is correct in actual installation once it is checked by this small instrument.

Lighting designer and installers must know how to use it properly. The lighting calculation result for the entire project will depend on how you measure the lux level correctly using this device. Anyway, it is very easy. All you have to do is find out where you will place the lux meter and how you will position it either vertically or horizontally.

To find out how to use lux meter, check this link for manual.

Place the lux meter for these areas: Cashier area - at the top of cash counter, selling area – 1m above the floor (take at least 4 different areas), Display window – on the floor (horizontal) and on the mannequins (vertical), merchandize – at the top of display table, shelves – measure it on vertical calculation near the open shelves.

Luminaire Manual

This document will help the maintenance staff to easily recognize the luminaire and which part to buy in case of replacement. It will also guide them on how to properly maintain the fittings.

As the time pass by, some items will become obsolete. Through this manual, they can still find out if there are possibilities to replace it with something else like brand and other type, like conventional to retrofit LED lamp.

Most of big projects are very strict to get and keep the luminaire manual. When there are changes, like staff replacement and technology advancement, this document will guide them to find out the original fittings.

Luminaire manual includes: luminaire datasheet, lamp datasheet, ballast or gear datasheet, installation manual, warranty certificate, and maintenance manual.

We must provide these documents to the client in case they requested it. It is our duty to give them all the information they need regarding the lighting design we did. Of course, we will need the help of our colleagues to get all these documents.

Below is the sample of luminaire manual.

So, there you go! We're done with the tools that we need to use. In the next chapter we will discuss the software that we need to learn to become an effective lighting designer.

FKK Corporation

LED LINEAR SEAMLESS LIGHT LSF

Accent / Cove Lighting

Manual

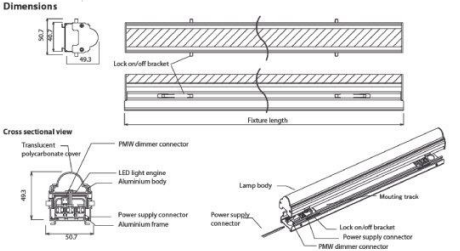
LSF - 2012.07.05

FKK Corporation

11 Tsutsumisoto-cho Kisshoin Minami-ku,
601-8399 Kyoto, JAPAN
TEL +81(0)90 5364 7527
URL www.fkk-corporation.com

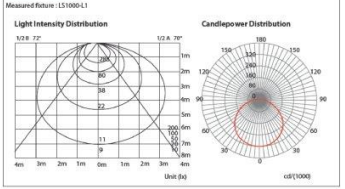
Specification

Dimensions



Photometric data

Measured fixture : LS1000-L1



Beam

Specification — AC 100-240V specifications

Reference	Length (mm)	Weight (kg)	Number of LED	Watts (W) 100/240V	Amps (A) 100/240V	Maximum length (lamps) 100/240V	Luminous flux (lm)
LSF-500	500	0.59	99	7.3/9.0	0.09/0.06	22/33	600
LSF-850	850	0.87	162	12.1/15.0	0.14/0.07	14/28	1050
LSF-1008	1000	1.01	198	14.7/19.3	0.16/0.08	12/22	1240
LSF-1258	1250	1.21	243	18.2/23.0	0.21/0.10	9/20	1570
LSF-1508	1500	1.41	297	23.0/29.7	0.27/0.12	7/16	1920

50/60Hz Frequency. Protection: built-in surge protection, ISO protection. Concerning maximum length of connection, if you want to connect together fixtures of different length, please do it within 7 Amps.

Accesories:

- Power supply leader cable LDG-LDGP
- Jumper cable WHK

LED colors:

- L1=Light bulb (2700K)
- L2=Light bulb (2700K)
- WW=Warm White (3500K)
- W=White (4300K)
- N=Neutral White(5000K)

Environment of use: Indoor only
Operating condition / Temperature: 5°C to +40°C
Humidity below 85%
Standard compliances: PSE, CE (in process)

Risk of fie, electrical shock or injury. Observe the following instructions when installing this product.

Use this unit only in the manner intended by the manufacturer. If you have any questions, contact us.

Before installing, servicing or cleaning unit, switch power off at the service panel and follow appropriate lock out/tag out safety procedures.

Do not use in wet locations.

This device must be supplied with 100-240 V AC/50Hz and connected to an individual properly grounded branch circuit, protected by a 15 ampere circuit breaker.

Electrical connection of leader cable(s) to 100-240 V AC must be prepared by a trained, qualified pesonnel following all applicable national regulations.

Risk of electrical shock. Disconnect power before install.

Risk of electric shock or damage to unit. Please do not put metal parts in the fixture.

Risk of electric shock or damage to unit. Do not use fixture with broken cover.

Risk of electric shock or damage to unit. To clean the fixture, please use a dry cloth. Do not use water, benzene or organic solvent to clean.

This fixture is for indoor use only. Please do not use in the following environments.
· Outdoor and high temperature environment (more than +40 °C).
Normal operating temperature : 5 to +40 °C

- High humidity (85%) environment
- Excessive amount of dust or corrosive gas environment
- Flammable gases environment
- Airtight environment
- Environment exposed to water splash
- Environment directly exposed to sea water or organic solvents
- Environment exposed to direct sunlight
- Environment exposed to high magnetic flux
- Environment exposed to vibrations
- Unstable environment

Please do not use infrared remote control device in the vicinity of the fixture, it may cause malfunction.

Please do not attempt to do the following to the fixture:
· Peeled off after installation
· Disassemble or modify, such as drilling hole
· Force-pulling, twisting

- Cut or scratche the power supply cable
- Use damaged power supply cable
- Drop it, hold down
- Apply severe vibration or impact

- Electrical connection of leader cable(s) to 100-240 V AC must be prepared by a trained, qualified pesonnel following all applicable national regulations.
- Plese use specified power supply cable (sold separately) and follow installation manual before switch power supply on.
- Information provided is subject to change without notice. All values are design or typical values when measured under laboratory conditions.

Chapter

10

Lighting Design Report

Our perception of architecture will be influenced by light. – Architecture & Light

You made it to this chapter, congratulations! In this chapter we will discuss, evaluate, and analyze the result of our lighting design. We need to make sure that our design is correct and according to the client's requirements and standards. We will discuss the different lighting design reports one by one. These reports are:

1. Lighting Calculation Report
2. Pseudo-colors
3. Aiming Diagram
4. Images
5. BOQ and Specifications
6. CAD File / Lighting Layout
7. Datasheets
8. Conceptualization and Product Selection

These reports must be fully understood by the client or the consultant. Some clients prefer to see images or they are into visuals, some are into numbers or they are more into technical details. We need to make sure that we will fulfill both of these clients.

I will give you the links for the sample reports to be downloaded for free.

Lighting Calculation Report

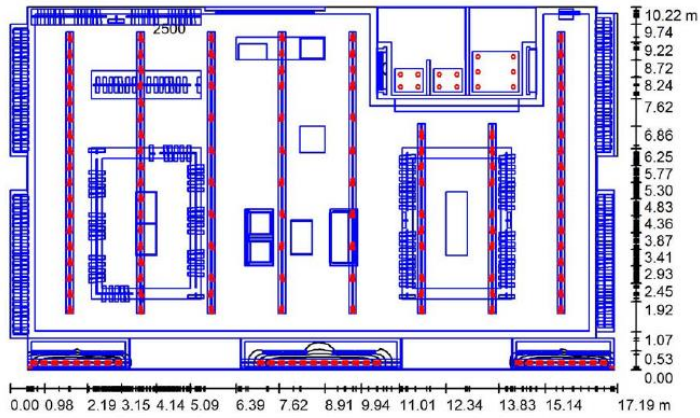
This is the report generated from Dialux evo through lighting design calculations. The contents may vary according to the necessary information that needs to submit to the client. Most of this information consists of bill of quantity, datasheets, summary result, rendered image and pseudo-color. There is other information available in the “output tab”, but these are the usual pages for a short report.

These are some of the most important information that needs to see in your report. The room height, maintenance factor, reflectance factor, luminaire mounting height, types of luminaires, calculation surface height, average lux level, overall uniformity, and last but not the least, guess what? The images and pseudo colors! Retail lighting needs visuals, therefore these last two information are the most critical data that needs to submit.

Below is the sample image of the summary result extracted from the calculation report.

Click this link to access the sample reports, and click this link for our video tutorial. This video tutorial will teach you on how to generate the calculation report from Dialux evo. Enjoy learning!

Shop / Summary



Height of Room: 4.345 m, Maintenance factor: 0.67 — Values in Lux, Scale 1:132

Surface	u [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	1106	83	12493	0.075
Floor	75	592	9.87	7861	0.017
Ceiling	70	45	26	156	0.586
Walls (32)	68	234	23	2164	/

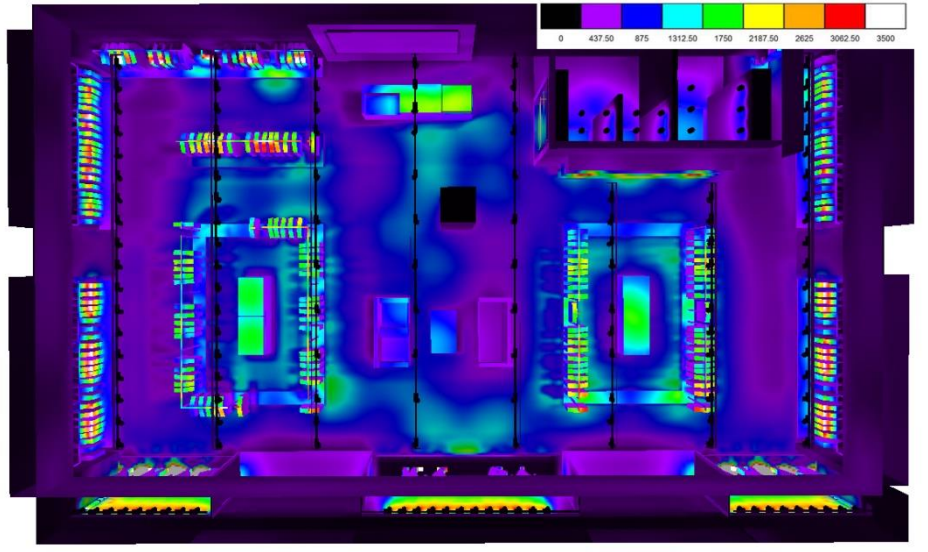
In this image you will see the height of the room, the maintenance factor, lux levels (average, minimum, and maximum) for all the surfaces (workplane, floor, ceiling, and walls), overall uniformity and the layout of the fittings (red dots) on the floor plan together with the objects or furniture inside the room (blue lines).

Pseudo-colours

Pseudo-color is the visual representation of the numbers to identify the intensity of light on the surface. It also represent the isolines but in color.

When you put a lot of objects inside the room, the lux level and uniformity will change dramatically, because the objects create shadows and hide some parts of calculation surface, which in turn destroys the overall uniformity and lowers the minimum lux level. Therefore, the other way to judge the lighting design is to look for colors. When you light the merchandise, the only way you can tell that it has enough light is through pseudo-color. It is impossible to put calculation surfaces in all the merchandise inside the selling area. It will be more difficult and time consuming.

Below is the sample image of a pseudo-color.

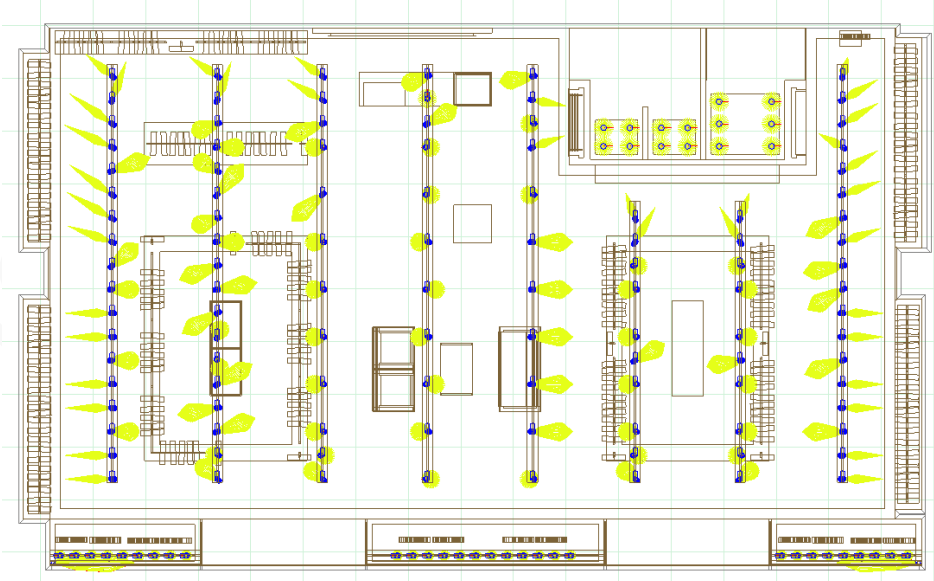


Aiming Diagram

Some installers or project contractors ask for aiming diagram. This is to make sure that the luminaire is aimed in proper direction. The image below is a screen shot in Dialux evo showing the luminaires' photometric aimed in different directions. Aside from this image, the report will also give the exact numbers for the angle and directions of every fitting.

This document is very important for the installer during installation. This will guide them which spotlight aimed which and which floodlight aimed into.

Let's go and learn how to get this aiming diagram. Check this video tutorial for more information, and this link for sample aiming diagram file. Better show it to you than telling about it. Wink!



Images

These images are from raytracing and rendering. You will distinguish the difference by looking at the glossy effect of the raytrace image and the matt effect of the rendered image. Retail lighting design needs to show these images, at least for non-technical people, to understand how it will look like in reality.

Creating different views will help the client understand the overall effect of light inside the room. It will also show which part is dark and which part is well lighted.

These images doesn't necessarily have to be very realistic like what other softwares can do (like 3D Max and Sketchup). It just have to be look good and light is visible in every part of the room and in every merchandise. Objects or furniture and merchandise don't have to be very detailed and realistic. Seeing the object as it is will be enough to understand the overall look inside the room. Like what I mentioned a while ago, importing detailed objects in your design will slow-down the calculation and rendering time. Because the more the mesh and lines the longer it takes for the computer to analyze every bit of it.

Box type object is enough as long as you will distinguish what king of object it is. Whether it is the cash counter, the shoes, the clothes or even the mannequins.

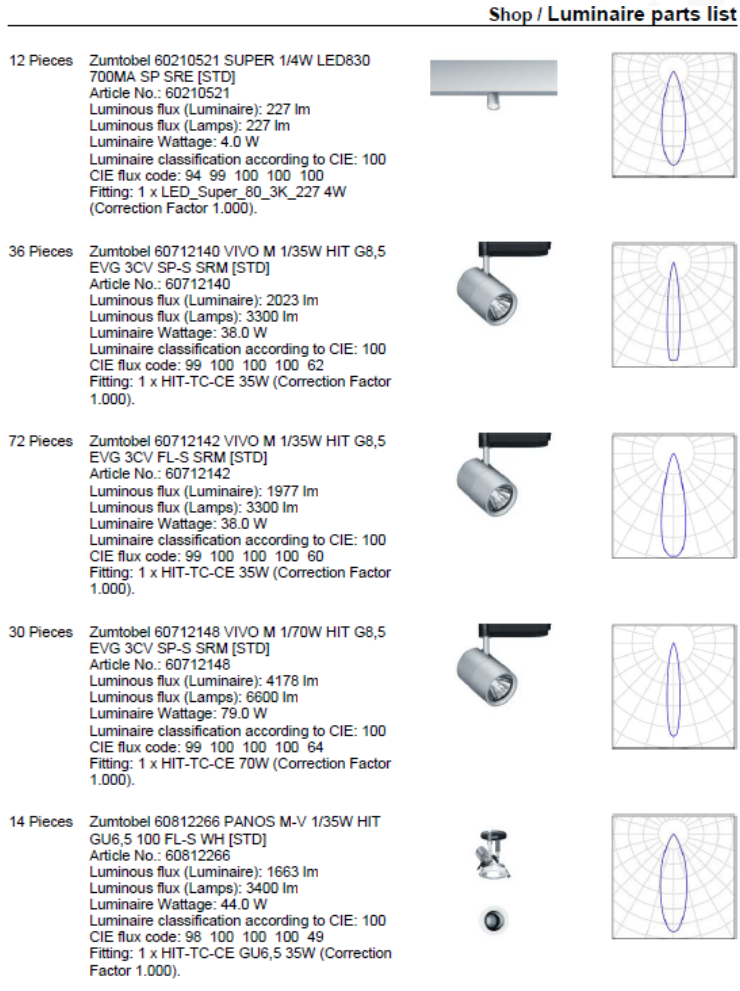
Check this video tutorial to find out how we will create images in our lighting calculation. Also, click this link for free sample images for retail lighting design. Let's go!

Below are sample images generated from the calculation using raytracing and rendering. One is top view and the other one is normal view.

BOQ and Specifications

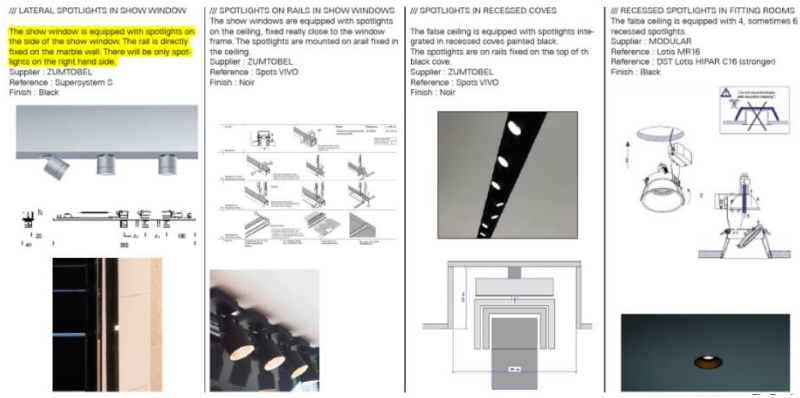
Bill of quantity and specifications can also be extracted from the calculation report. This document is important to identify what kind of fitting has been used in the design. While quantity is important for quotation or pricing.

Below is the sample pages for BOQ and specifications.



Shop / Luminaire parts list

12 Pieces	Zumtobel 60210521 SUPER 1/4W LED830 700MA SP SRE [STD] Article No.: 60210521 Luminous flux (Luminaire): 227 lm Luminous flux (Lamps): 227 lm Luminaire Wattage: 4.0 W Luminaire classification according to CIE: 100 CIE flux code: 94 99 100 100 100 Fitting: 1 x LED_Super_80_3K_227 4W (Correction Factor 1.000).		
36 Pieces	Zumtobel 60712140 VIVO M 1/35W HIT G8,5 EVG 3CV SP-S SRM [STD] Article No.: 60712140 Luminous flux (Luminaire): 2023 lm Luminous flux (Lamps): 3300 lm Luminaire Wattage: 38.0 W Luminaire classification according to CIE: 100 CIE flux code: 99 100 100 100 62 Fitting: 1 x HIT-TC-CE 35W (Correction Factor 1.000).		
72 Pieces	Zumtobel 60712142 VIVO M 1/35W HIT G8,5 EVG 3CV FL-S SRM [STD] Article No.: 60712142 Luminous flux (Luminaire): 1977 lm Luminous flux (Lamps): 3300 lm Luminaire Wattage: 38.0 W Luminaire classification according to CIE: 100 CIE flux code: 99 100 100 100 60 Fitting: 1 x HIT-TC-CE 35W (Correction Factor 1.000).		
30 Pieces	Zumtobel 60712148 VIVO M 1/70W HIT G8,5 EVG 3CV SP-S SRM [STD] Article No.: 60712148 Luminous flux (Luminaire): 4178 lm Luminous flux (Lamps): 6600 lm Luminaire Wattage: 79.0 W Luminaire classification according to CIE: 100 CIE flux code: 99 100 100 100 64 Fitting: 1 x HIT-TC-CE 70W (Correction Factor 1.000).		
14 Pieces	Zumtobel 60812266 PANOS M-V 1/35W HIT GU6,5 100 FL-S WH [STD] Article No.: 60812266 Luminous flux (Luminaire): 1663 lm Luminous flux (Lamps): 3400 lm Luminaire Wattage: 44.0 W Luminaire classification according to CIE: 100 CIE flux code: 98 100 100 100 49 Fitting: 1 x HIT-TC-CE GU6,5 35W (Correction Factor 1.000).		



Some designers prefer to create a separate BOQ and specification in tabulated form using excel file, because some typical areas don't need to calculate again. This is the reason why the quantity in the calculation report sometimes is not complete due to this typical areas that are not included in the calculation.

Most of the information to be placed in the specification sheet is from the datasheet or brochure of the luminaire.

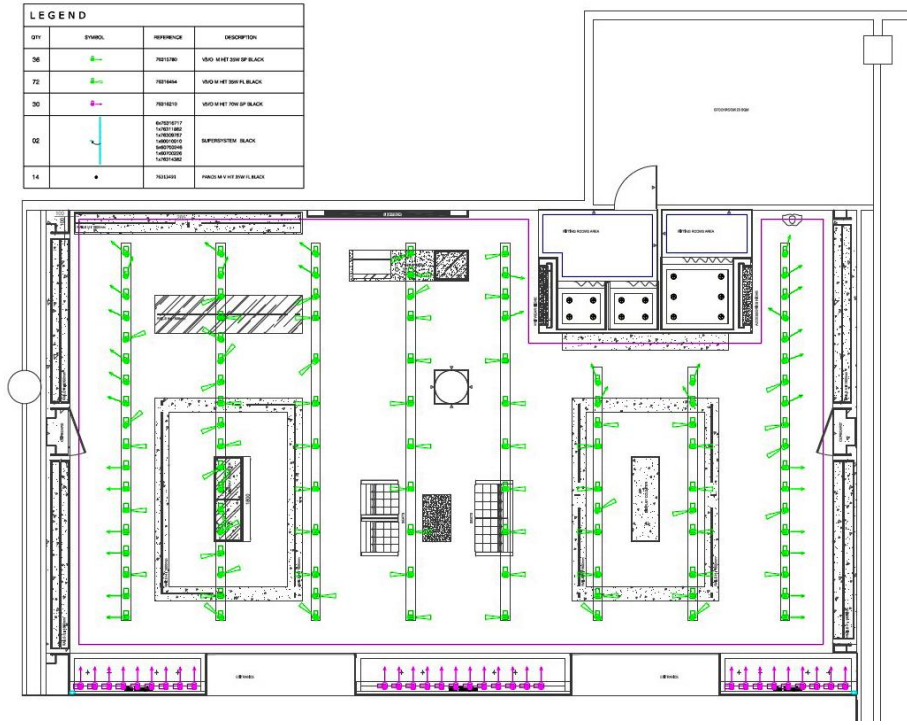
Let's find out in this video tutorial on how we will generate these documents. Also, click this link to download the sample bill of quantity and specifications.

CAD File/ Lighting Layout

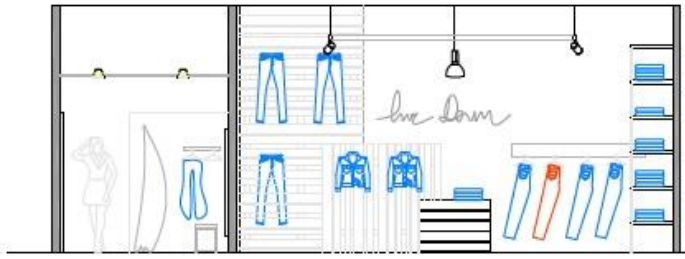
Aside from images and calculation report, we can also export the lighting layout through AutoCAD file. This lighting layout is important to installer, similar to aiming diagram which we discuss previously. Lighting layout shows where is the exact location of the fittings in the floor plan or reflected ceiling plan. The dimension is

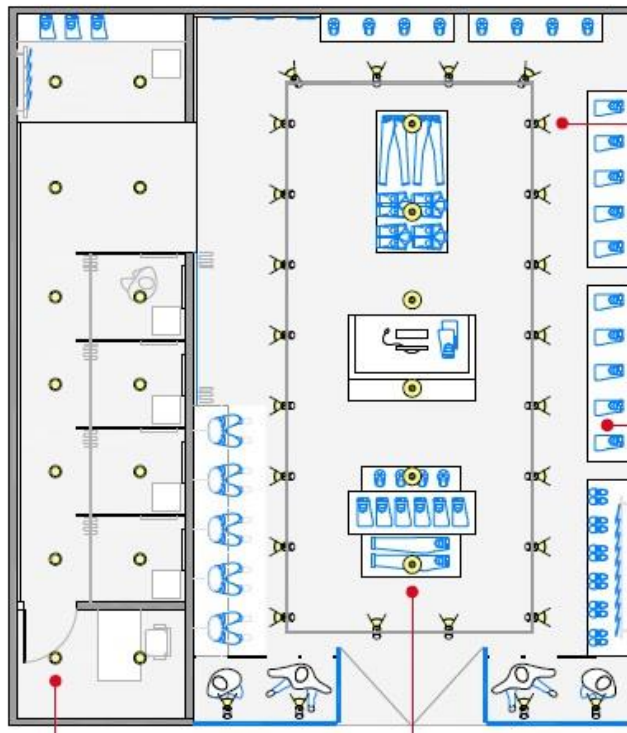
included to know the spacing of the luminaire from each other and to other parts of the room. Legend is also included to identify the fittings in the drawing. Sometimes the calculation result is included in the lighting layout, but this is just an option if the client prefer to add it.

Below is the sample image of lighting layout using AutoCAD. The green and pink dots are the spotlights, while the grey lines are the floor plan and furniture.



So, let's proceed now and see how to extract this lighting layout from Dialux evo through this video tutorial. While, this link will give you the sample layout in AutoCAD file.





Tonic spotlight
LED downlight with high colour rendering (3000/4000 K, CRI > 90, up to 3000 lm)

ArrowFlex
LED strips for seamless indirect lighting (2700/3000/ 4000 K, 870 lm)

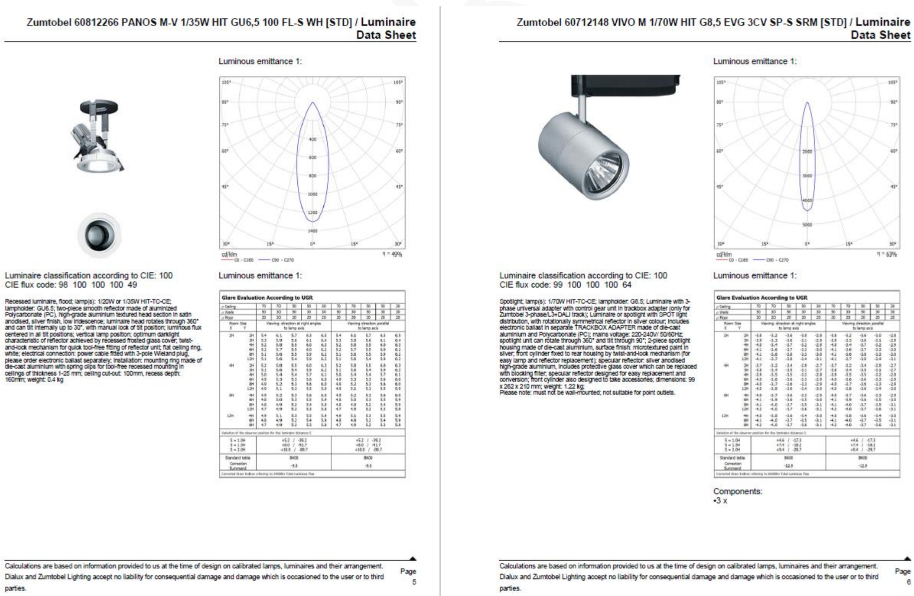
Chalice Pro
LED downlight with perfect colour rendering (3000/4000 K, CRI > 90, up to 3.000 lm)

Glacier II LED
Decorative pendant luminaire (3000/4000 K, up to 6000 lm)

Datasheets

Datasheet is the complete report of every luminaire. All the technical information of the luminaire can be found here, that includes: picture of fitting, mounting type, wattage, color and type of lamp, color and type of materials, weight, lumen output, efficiency, photometric diagram, size, IP rating, IK rating, glare value, beam optics, etc. As I have mentioned before, the information from specification sheet is mostly from datasheet.

Below is the sample image of datasheets for adjustable downlight and spotlight.

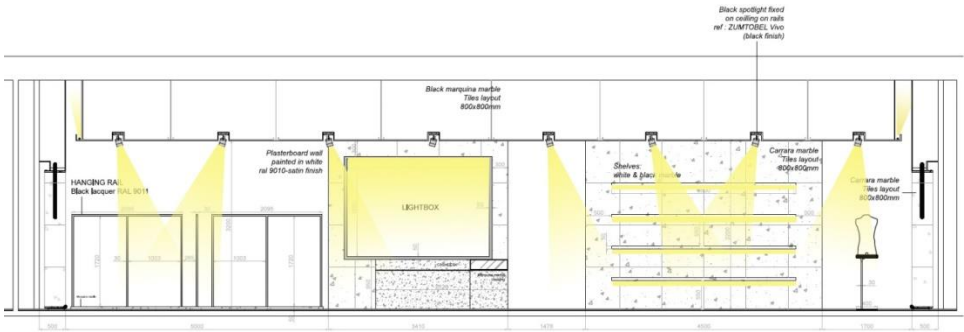


Let's go and find out how we can include this datasheet in our lighting design calculation report.

Conceptualization and Product Selection

Before the lighting designer start working on the calculation, we sometimes sketch first or plan which type of luminaire or how to mount the fittings inside the retail shop.

This is like the thinking stage while we are checking all the drawings and other documents from the client. If the client is already decided what kind of fitting to be used, then our role is to select from the range what is the right wattage and beam angle to use. We have to make sure that the lux level and proper distribution has been achieved, even though there is pre-selected luminaire.



My style of conceptualization and product selection is through the use of sketches and highly imagination. I usually print the drawing and put marks on every part where I want to put luminaires. Then, I will select from our product range which is the suitable luminaire based on what I imagined.

You can do this conceptualization and product selection with the client, so both of you can decide which fitting is the right one. Sometimes, the clients themselves have their own lighting concept

and all you have to do is to follow it and select the right fittings based on their concept.

Below is the sample image showing the lighting concept based on the rendered image created by the architect.

Ok! We are almost done with this chapter! I hope you are now confident to prepare your lighting design report. Let's go and check this video tutorial on how I do my lighting design concept.

If you have your own style, kindly share with us so other lighting designers will learn from it. You can send your story to my email address: nelca.roco@nrocolightingdesign.com.

Chapter

11

Lighting Design Software

What you see is the light. – Nelca Roco

Software is the most important tool for a lighting designer. It is the thing that supports the validity of the design. Some lighting designers prefer to use Photoshop in their design, but, if you do most clients will ask you how real it will be in the actual installation? Even if you create the most wonderful Photoshop lighting design solution, at the end of the day, you still need to double check if it is really possible. To do that, we will need lighting design software. There are many lighting design program available in the market, but we will discuss the most common three (again, these are just my opinion -objection, correction and violent reactions are allowed – please send me an e-mail). These are:

1. Dialux and Dialux evo
2. AGI32
3. Relux

There is also additional software that we need to learn, to support our overall lighting design solution. These are:

4. Photoshop

5. AutoCAD

Photoshop and AutoCAD are the supports, they cannot run the lighting design calculations. The first three software tools are the real workers and they have different advantage and disadvantages. To know more about the comparison of these three, check this study by Peter Byrne from Brunel University, Comparison Study of Popular Lighting Simulation Software.

You may also want to check the survey done by Ezzat Baroudi of Erco, about which is the best lighting simulation and design software. During my last visit, Dialux got the 75% vote by popularity.

Whether you are using Dialux, Dialux evo, AGI32, or Relux right now, it is ok, this e-book is not based on any one in particular. However, the tutorials are done in Dialux evo, so I would suggest you focus on Dialux evo for now and explore other tools later.

So, let's start and check the software tools one by one!

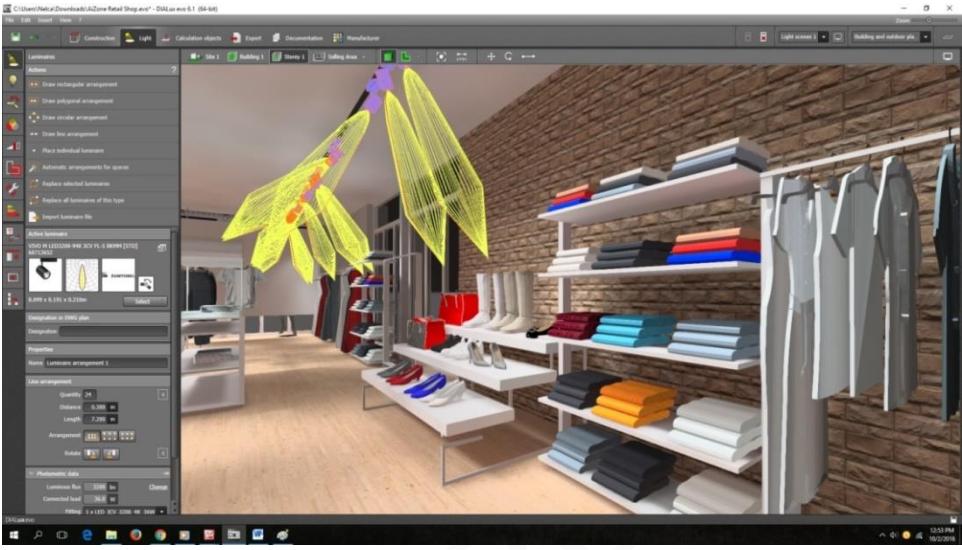
Dialux evo

Dialux evo is the most popular software in lighting design today. (Hey, again, my opinion. We can have survey about it if you like). I am not promoting Dialux, I don't have stocks in this company, hehehe! I just find it more pleasing and easy to use, so far. The resolution of Raytrace's image and the rendering style made me fall in love with this software. Not only that, the lighting design

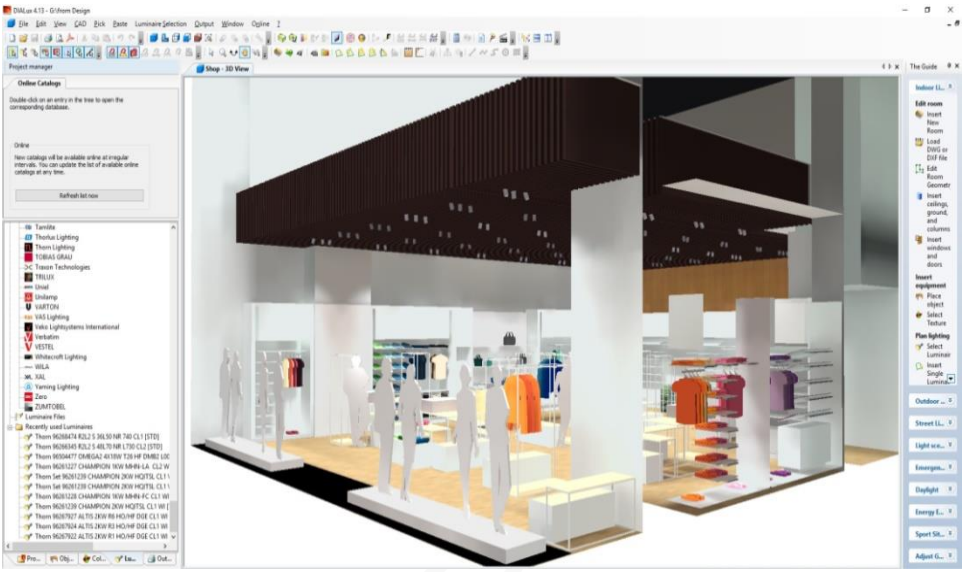
calculation report is also really cool! The flexibility and whole building simulation is also one of the best features of Dialux evo. Indoor and outdoor lighting design combined? Perfecto! I also like their very informative Dialux Wiki and Youtube Tutorials. For beginners, you must check it.

Aside from its cool features, this lighting design software is free! No cost at all! So, what are you waiting for? Download it now, because later in this chapter, we will be using this for our hands-on tutorials.

Note: Click on the image to direct to the Download section. This is free software. Lovely, right?!



Dialux regular is not as cool compared with evo, but for beginners and for those who are not into visuals, it is still valuable. Not only that, some clients prefer to have the calculation results in Dialux regular (well, those who haven't discovered evo yet). So far, the best advantage of Dialux regular is its capability to run the emergency lighting calculation and sports lighting design. For retail, it is still amazing to be used. See the sample image below.



AGI32

AGi32 is one of my favorite lighting design software tools. Before the evolution of Dialux, AGI32 already had its indoor and outdoor combination options. I also like the way it builds the building and objects from zero; it's like I am working in 3Dmax. Right now, the loveliest feature of AGI32 is its direct plug-in to Sketchup! This is the best feature of this software. Imagine the unlimited options for objects and textures direct to your calculations? That can only be done in AGI32.

Another feature of AGI32 that captures my heart, is its easy way of working with the sports lighting. Although we are focusing on retail shops right now, I would like to mention that this software will be your bestfriend if you are into sports and other outdoor lighting.

Below is the sample image of a retail shop done in AGI32. They also have Youtube channel, which for beginners is a must see.

Relux

Relux is another software program that gives amazing calculation reports today. I am not much into Relux, but one of my colleagues prefers to use this software. He said that it is easy to use and the

rendering image is also better than before. So, for whoever prefers to use Relux, then I think it is still one of the best.

According to Cooper Lighting, "RELUX is a lighting calculation and design tool with the ability to easily add and position luminaires, furniture and objects. A powerful visualization tool enables detailed renderings and an extensive results section provides comprehensive reports on your design."

If the project is lighting tunnels, then Relux is the best software ever, which you cannot say about Dialux and AGI32. You see? There different programs have different best features. It is up to you which you prefer to use. Although this tunnel software is not free to use, I think there is no other software that is better than this in terms of tunnel lighting design.

You can also see their lighting design tutorials in Youtube here.

Below is a retail project image done using Relux software.

RELUX®
light simulation tools

Photoshop

Photoshop is digital editing software for images. You cannot run a lighting calculation in Photoshop, but it will surely make your lighting design images more appealing!

I met one well-known lighting designer who only uses Photoshop in her designs. I was a little curious how she managed to become famous without even knowing any lighting design software. She said, “it is a matter of explaining it to your client”. Shocking right? But she made it, so I think one of you is doing the same thing.

Well, if she managed to convince the client without even showing the lux value and uniformity, then what more could she do if she used one of these lighting design programs.

Photoshop is the best software for presentation, I would say. Some clients are non-technical, they prefer to see colors and beautiful pictures rather than numbers. Therefore, Photoshop will help you convey and enhance the lighting design images. See these

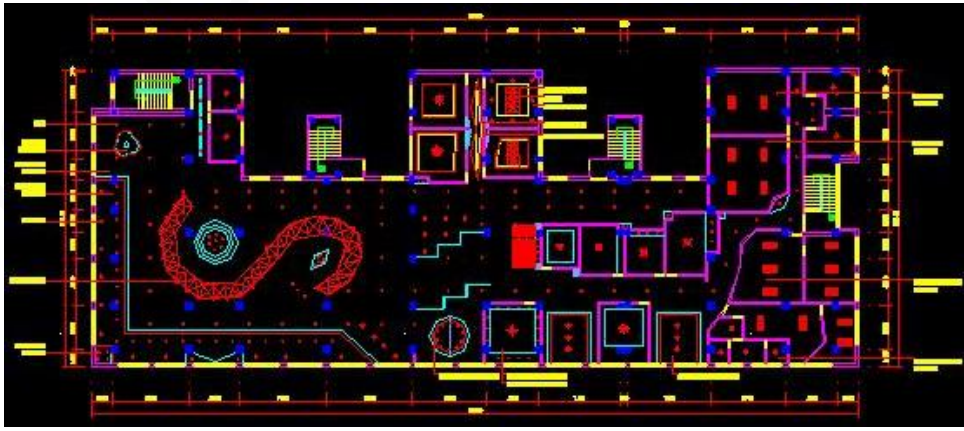
Youtube videos where Photoshop has been used in façade lighting design.

AutoCAD

And so, the last software that you need to learn is AutoCAD. Similar to Photoshop, you cannot run lighting design calculations in AutoCAD, but you cannot create lighting design calculations with precision if there is no AutoCAD drawing. This is where every point and line is shown for you to accurately put the walls and furniture in your design. In my opinion, this is a must-to-learn if you want to become a lighting designer. There are so many video tutorials on

how to use AutoCAD in the internet. Blogs and forums are also available if you find it difficult to understand. See sample images below for AutoCAD.

AUTODESK
AUTOCAD



Chapter

12

Lighting Design Creation – Hands-on Tutorials

Light is the sparkling jewelry of architecture. – Nelca Roco

Here we go! This is the best part of this e-book. The hands-on part. The how to's. The actual designing. Hands-on is the best way to learn to be a lighting designer. Theory and standards will only guide you on what to achieve, but hands-on training will teach you how to achieve it. Enough for the reading. This is now the time to use what we have learned on the previous chapters. We will now proceed to the actual designing and testing the luminaires we selected previously. Actual designing is the most difficult, but exciting part for me.

This chapter will test both your ability to select the right luminaire and your skills using the lighting software. Your imagination and creativity will work with your skills in computer simultaneously.

There are different tutorials you can find in this e-book, every topic has separate videos to watch. To get all the videos, check this link: https://www.nrocolightingdesign.com/video-tutorials.

What you will learn from these videos:

1. How to clean and understand the CAD file
2. How to build rooms using Dalux evo
3. How to create and import objects
4. How to select luminaires
5. How to aim the spotlights
6. How to create light scenes
7. How to generate and prepare the report
8. How to prepare the lighting layout

Each tutorials takes 30 to 45 minutes. Sample files and presentation slides are included in download section.

These tutorials are free. If you have comments or suggestions, just leave it in the box allotted so we can improve it.

Let's go and practice it!

Enjoy learning!

How to clean and understand the CAD file

Understanding what is inside the CAD file is one of the most important aspects of designing retail lighting. This is where all the information comes in: The ceiling height, furniture layout, height of the shelves, cash counter location, and much more.

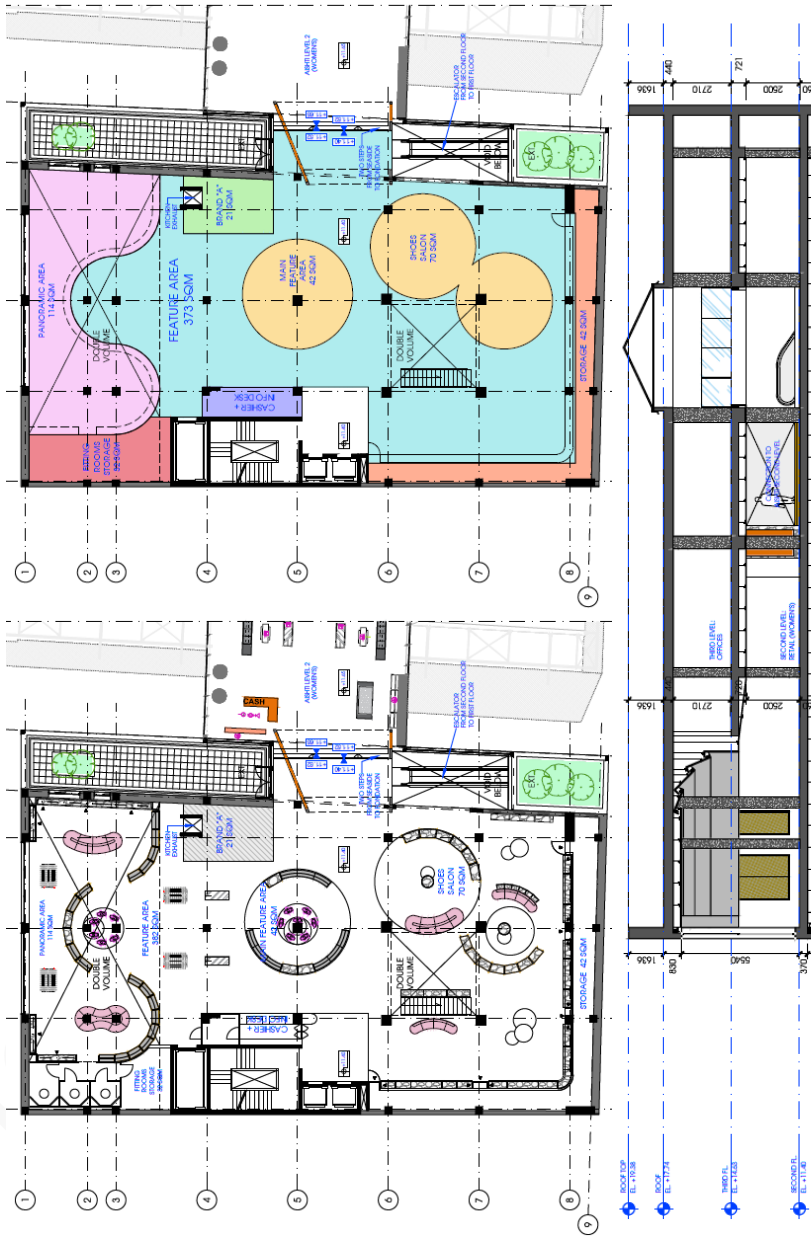
As a lighting designer, you must learn how to read the CAD drawing. One specific line means something; therefore, it is paramount to understand it. There are lots of video tutorials in Youtube on how to learn the basics of AutoCAD. The important information to look for in the drawing are; the boundary or wall, furniture layout, ceiling design and height, shelves, colors and texture.

The very first step to do before importing the CAD file into Dialux evo is to clean the drawing and put the XYZ axis to zero. Then, the next thing to do is to check the scale.

Using proper scale is the most common mistakes done by lighting designers.

Below is the sample image of AutoCAD file to be imported into Dialuxe evo. You can see the furniture layout, the ceiling layout, and the section drawing of the retail shop. Floor plan has been color-coded to identify the functions of the area.

Furniture must have detailed drawing so we can build it and incorporate it to the calculation.



Click this link to start our first hands-on tutorial.

How to build rooms in Dialux evo

Now we are familiar with the AutoCAD drawing, let's go and explore the Dialux evo software. For this tutorial, we will be using Dialux evo only.

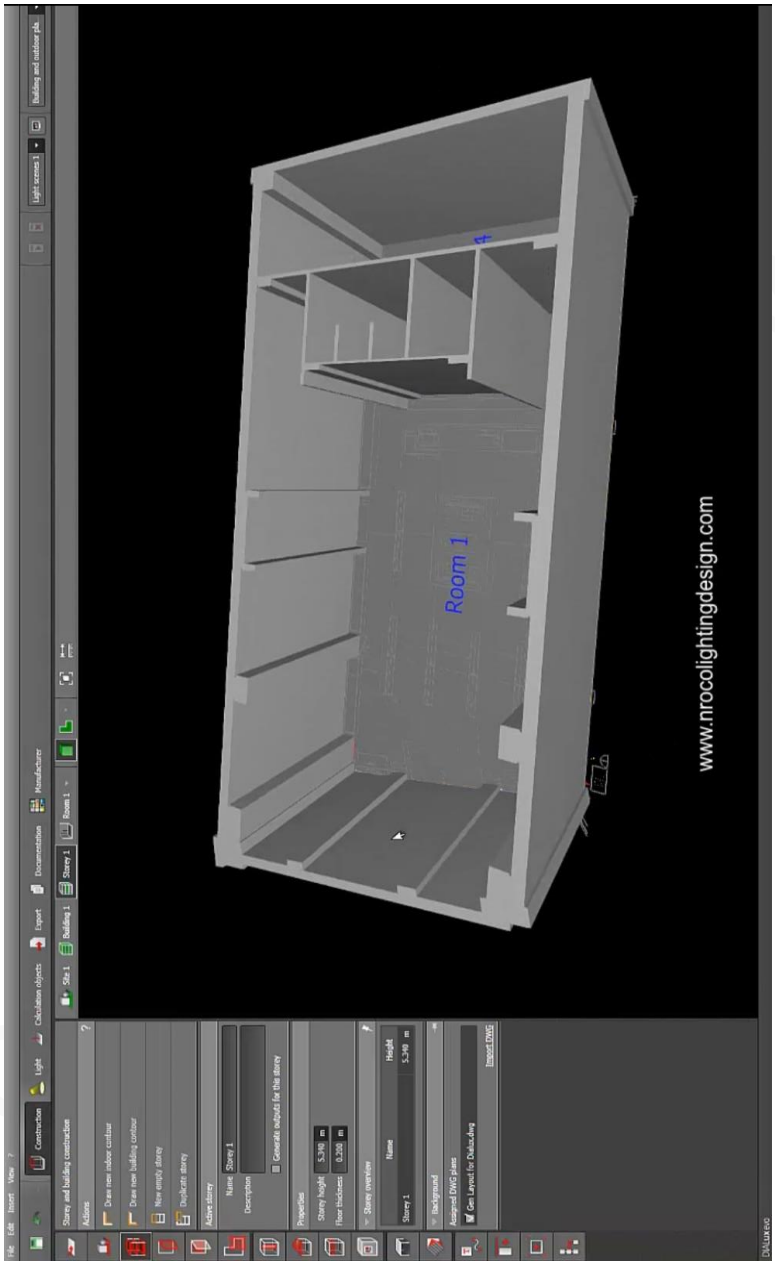
Dialux evo is easy to use. The main objective for a retail shop project is to build up the whole room with furniture and proper texture.

In this tutorial, you will learn how to create the room, insert the ceiling, partitions, doors and windows, and how to create or add textures. Aside from these, you will also learn how to create ceiling channels and slots on the walls.

I am sure that you will love this tutorial because it is so fun to do. I will guide you step by step on how to do it. So, prepare yourselves and let's start exploring the wonders of Dialux evo software.

I hope you enjoy it!

Below is the sample image screen shot in Dialux evo. It shows the window tabs of Dialux evo, the rendered image with furniture and luminaire inside, and the color and texture used in the design.



Check the video tutorial here:

How to create and import objects

So, we're done with the room build-up. I'm sure you're excited now to put the furniture and fixtures inside the store. Unlike other projects, retail projects require objects to see the effect of lights. At this point, we don't so much need uniformity, instead the overall throw of light onto the surface is the main concern, and it can be seen by looking at the pseudo color.

In this tutorial, we will teach you how to import objects from other sources and to create our own 3D files.

There are many options on how to have 3D objects in Dialux evo. One is by creating them inside Dialux evo, the other is by importing them as 3ds files from other software like Sketchup or 3Dmax.

There are free 3ds files available on the internet, like www.3darchive.net and 3dWarehouse. The problem with these is most of them are big files, and once you inserted them to Dialux evo, it will slow down and sometimes crash due to its huge size.

Make sure that you select 3d objects which are less than 1mb. Otherwise, your calculation and rendering time will take longer than usual. Your evo file will also become heavy which will make it difficult to open and save.

Check the video tutorial here:

How to select luminaires

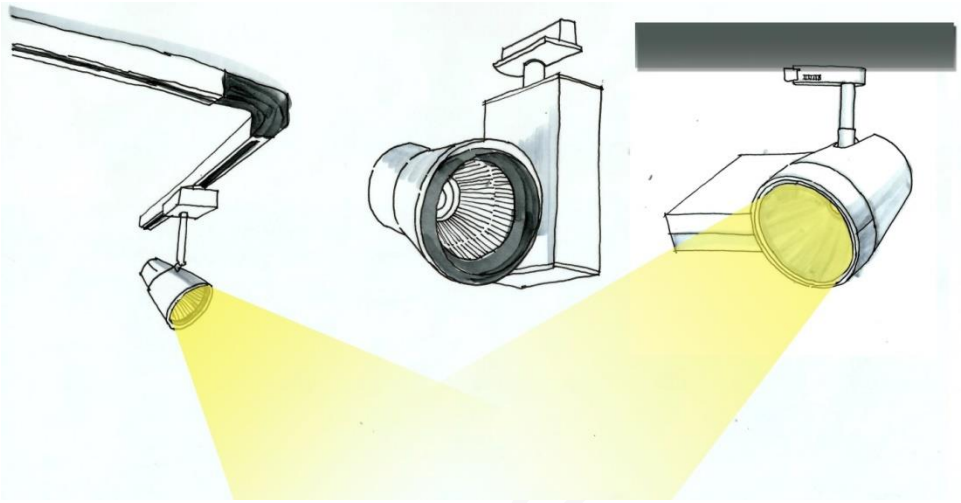
Now, your retail shop is looking good! It's time to light it up! Are you excited now?

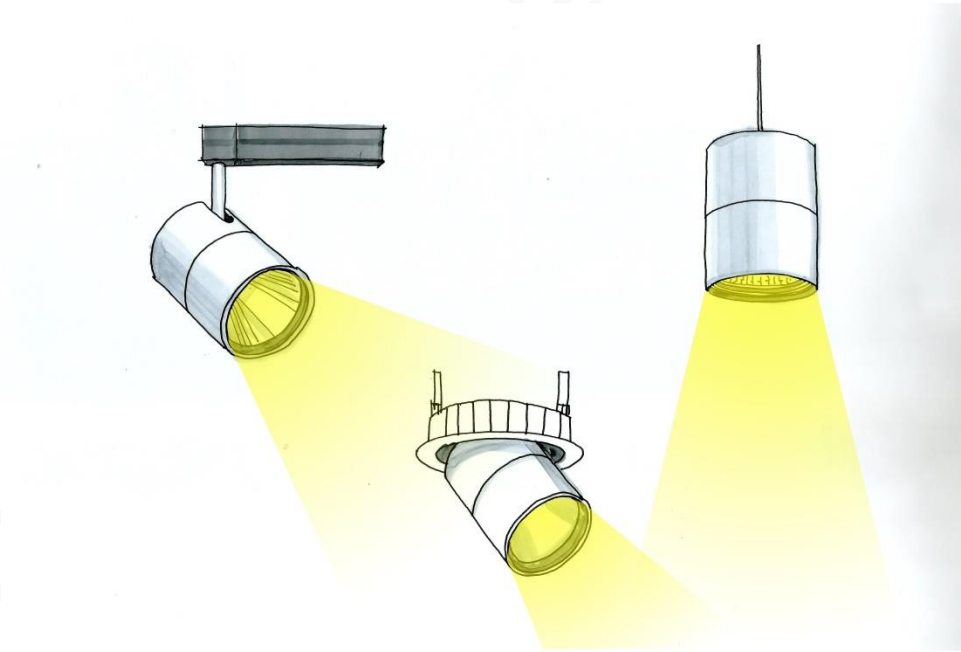
This time we will select the luminaire, the right luminaire or the specified luminaire. If you are working in a lighting company, then it is easy for you to select your fittings. If not, then I will teach you how to get the IES or ULD or LDT files from different manufacturers. We will explore the websites of different lighting manufacturer and we will see how easy or difficult it is to choose and to extract the IES files in their website. Some website has an option for drag and drop, while other companies still need to download the IES or ULD file first before you can use it.

In this tutorial, you will learn how to insert the luminaire, select the luminaire and arrange the luminaires. It is not always spotlights and track lights that are the best solution in retail lighting, there are other ways to highlight the merchandise. I will guide you from selection to installation. Hahaha! Installation to Dialux evo.

So, let's go and select our luminaires!

Below are sample images showing the sketch of typical luminaire used in retail application; track lights and adjustable downlights.





Check the video tutorial here:

How to aim the spotlights

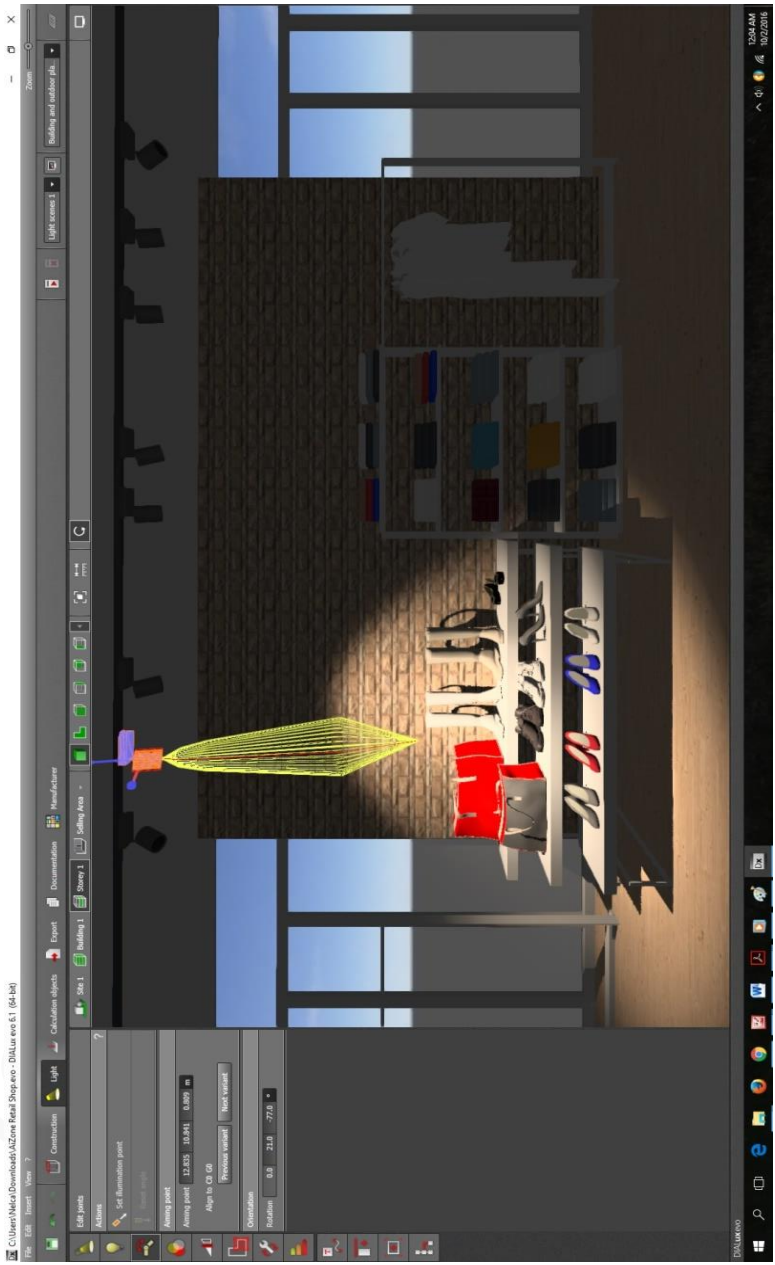
We are almost there! This time, we need to aim the spotlights properly. This is very important because we must consider the glare. Remember our previous discussion about the glare? Some areas need to be glare free; otherwise the exciting experience of the customers will turn to headache. Not good, baby.

Aiming is also important to installers, although, overtime the aim will change as per the new layout of the shop, but at least on the first installation, the spotlights will aim properly and precisely.

There are rules about aiming the spotlights. Some luminaires must not exceed 25 degree angle. While, some may tilt more than 25 degrees, but with restrictions.

In this tutorial, you will learn how to use the aiming option of Dialux evo. This option is one of the amazing features of Dialux evo! I'm sure you will like it too. You will also learn how to arrange the luminaires so they don't clutter the ceiling. Let's go and do it now!

Below is the sample image screen shot from Dialux evo showing the lighted spotlight aimed at the merchandize. It also shows the cool photometric diagram of the spotlight and tilting option of this luminaire.



Check the video tutorial here:

How to create light scenes

Light scene is one of the exciting parts of lighting design in retail shops. Of course, we will need lighting control to do this. Light scenes can be used in a dynamic lighting style. If the retail shop prefers to have color changing lighting, or different lighting effects on some occasions, then this light scene is a must for them.

In this tutorial, you will learn how to create scenes in your lighting design. This is another powerful tool of Dialux evo. You may also do the calculation for daylight. We will include this in the tutorial.

The light scene is also good for identifying the luminaires by group or by section. For example, if you want to turn on all the perimeter lights, or only the downlights, you can do this in this light scene option in Dialux evo.

So, let's go now and start creating light scenes!

Below is the sample image screen shot in Dialux evo showing the light scene bar below the screen, the calculation result on the right side, and the calculation surface in light yellow color with isolines.

Check the video tutorial here:

How to generate and prepare the report

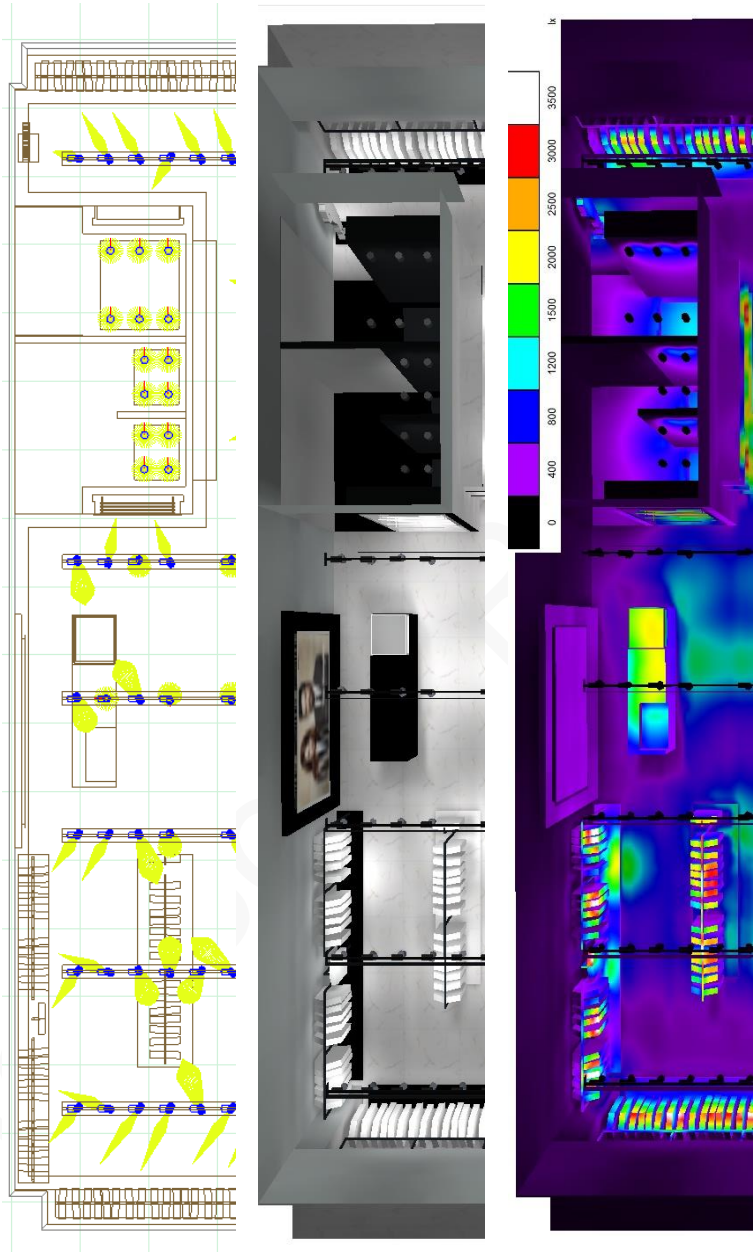
In practice, there are three important pages that our clients always want to see. These are the lighting layout, the pseudo-color and the render image. The calculation summary result is sometimes needed, but that is if they want to see the total power load consumption.

The lighting design calculation report requirement varies from to client. Some clients ask for these three pages, while others ask for the full report including raytrace images and value charts.

Dialux evo has the power to save views from different viewports and these views can be turned into nice pictures in the report. I love creating lots of views; it is like you are taking pictures in your design!

In this tutorial, you will learn how to generate a calculation report based on the default of Dialux evo, and how to prepare a customized retail lighting design calculation report. So, let's go and let's get started!

Below are some images extracted form Dialux evo showing the lighting layout, rendered image, and pseudo-colour. These three are the usual images included in the report.



Check the video tutorial here:

How to prepare the lighting layout

Then we're at the final! We are about to finish our project. I'm sure you are now confident to show and submit your design. But wait! Let's prepare the lighting layout in AutoCAD. It is very important for your client to see the exact location of your luminaires. This is also one of the important documents required to complete a working drawing, especially in the electrical part of the documentation.

In this tutorial, you will learn how to export the lighting layout from Dialux, create a better presentation in Autocad, label the luminaires, create a legend, provide dimension, and show the aiming orientation of the luminaires.

As an addition, you will also learn how to create a Title Block and PDF report. You will also learn how to count the luminaires in AutoCAD without counting them one by one – this is so important if you are working in a big retail shop like a supermarket or department store. This is the best secret and I know you will love it! So, let's go and check it out!

Below is the sample image of lighting layout taken from the CAD file showing the floor plan, luminaire legend, and Zumtobel title block.

Check the video tutorial here:

Chapter

13

Retail Shops Project Evaluation

Light is the invisible hero behind beautiful things. – Nelca Roco

Before we end Book 1, let us evaluate some existing retail stores and see how we can apply what we learned, critique these retail shops and learn from these designs. We will evaluate the following retail stores:

1. Chanel
2. Prada
3. Gucci
4. Dolce & Gabbana
5. Guess
6. Lacoste
7. Diesel
8. Adidas

These famous retail clothing stores have different lighting style which can be seen in their brands. You will notice their branding even in the lighting.

I will explain a little more about this later, describe what is in the brand image, and further go through the basic information about why they selected this kind of lighting. In this discussion, I will use the same words we used in the previous chapters.

Hold on to your seat and let's dig deeper on what is inside the shop of these famous retail brands. Let's start with Chanel.

Chanel

Chanel is French, privately held company, owned by Alain Gerard Wertheimer. Chanel is a high fashion house, that specializes in-haute couture, and ready-to-wear clothes, luxury goods, and fashion accessories.

Chanel boutiques are famous for their crisp lines. The lighting design signature uses white color with high CRI to complement the crisp black lines. The lighting style is formal and the target group belongs to Dominance. Diffuse light and uniform ambience is highly considered.

For more information on Chanel's flagship store, check this retail design blog.


CHANEL

Prada

Prada is one of the famous signature clothing brands. It is an Italian luxury fashion house, specializing in leather handbags, travel accessories, shoes, ready-to-wear, perfumes and other fashion accessories, founded by- Mario Prada.

Prada is famous for its checkered glossy floor design. The lighting style is between formal and dramatic. The target group belongs to Dominance and Balance. Gimbal spotlights are widely used inside the store, with some diffuse lights coming from the cove or back-lit walls.

Some stores have 4000K CCT, while others have 3500K.

For more information of Prada flagship store, check this retail blogs.

Gucci

Gucci is an Italian luxury brand of fashion and leather goods. It was founded by Guccio Gucci.

The lighting style of Gucci is Balance. It uses warm color light and the overall ambience is uniform. The target group belongs to Balance and Dominance.

Gimbals and downlights are widely used.

For more information on Gucci flagship store, check this retail design blog.

Dolce & Gabbana

Dolce & Gabbana is a luxury Italian fashion house, founded by Italian designers Domenico Dolce and Stefano Gabbana. Their style was originally inspired by the eclectic, thrift shop, Bohemia.

The prominent lighting style in their shops is the warm color of light and the hanging chandelier in the middle. The lighting effect is Theatrical and the target group is Stimulance.

Track lights are the main source of light, but some of their stores are now using back lights. The materials used inside the stores is not consistent, therefore some store looks brighter than the other.

For more of Dolce & Gabbana flagship store, check this retail design blog.


DOLCE & GABBANA


DOLCE & GABBANA

Guess

Guess is an American clothing brand and retailer. In addition to clothing for both men and women, Guess markets other fashion accessories such as watches, jewelry, perfumes, and shoes.

Guess' character of clothing can be both formal and informal. Therefore, the color of light mostly used in their shops is warm. The light is dynamic and adjusts according to the trend and occasion. Spotlights and some decorative lights are used. Storefronts convey the image of high- class, wild characters. The use of flexible lighting in display windows is prominent.

Want to see the Guess white Christmas? check this retail design blog.

Lacoste

Lacoste is a French clothing company that sells high-end clothing, footwear, perfume, leather goods, watches, eyewear, and most famously polo shirts. The company can be recognized by its green crocodile logo. René Lacoste, the company's founder, was

nicknamed "the Crocodile" by fans because of his tenacity on the tennis court.

This is a high-end brand for sportswear, compared to other sports shops. Lacoste belongs to the Formal style of lighting, and the target group is between the Stimulance and Dominance.

Vertical and horizontal illuminance is high, it usually uses 4000K color lamps. The combination of diffuse ambience and spotlights makes the shops bright and formal.

Using light-colored materials increases the overall uniformity and the clean arrangement of luminaires in the ceiling makes it more elegant.

For more information on Lacoste flagship store, check this retail design blog.

Diesel

Diesel is an Italian retail clothing company. It sells denim, and other clothing and accessories. The company is known for its

surreal advertising campaigns. It has been popular for producing ads that invoke weird images in lieu of direct product details. This includes global warming, accidents, and communist life style.

Denim is their main product, which conveys a rugged and tough look. Lighting style in this shop is Dramatic and the target groups belong to Stimulant or Adventurous.

Although its character is harsh, some of its shops use decorative lighting, mostly circular pendant lights. This is perhaps to emphasize the feminine and earthly side of the store (see image below).

High contrast and spotlights are widely used. Overall uniformity is disregarded; a theatrical or dramatic effect is the most important consideration in the lighting design. It seems that the client's instruction is only, "just put a spotlight on it".

For more information on Diesel flagship store, check this retail design blog.

Adidas

Adidas is a German multinational corporation that designs and manufactures sports shoes, clothing and accessories. It is the largest sportswear manufacturer in Europe and the second biggest in the world.

Adidas' lighting style is Dramatic, using high contrast to complement the dark surfaces and intensity inside the stores. Customer belongs to the Stimulance group if we want to talk about the Limbic ® Lighting Study. The lighting signature of Adidas is the three straight white lines - this creates the lighting brand. The intensive use of spotlights without decorative lights indicates that the shop has a masculine and sporty atmosphere.

The entrance says, "come in and let's talk about your passion for sports". Spotlights are used to highlight mannequins wearing athletic clothing. The dark materials used inside the store mean the lighting uses high intensity lamps. Even though the shop looks dark, the energy used inside the store is high. Note that dark surfaces absorb more light.

Overall, Adidas uses lighting to convey the brand.

For more information on Adidas flagship store, check this retail design blog.

And so, we made it!

We are done! All we need to do now is to keep on practicing and keep on reading information about the latest trends of retail lighting. Congratulations, and see you on our next e-book and video tutorials!

Bibliography

Books

SLL Lighting Design Handbook

The Lighting Handbook, IES 10th

Advance Lighting Guidelines 2003

Fundamentals of Lighting, by: Susan M. Winchip

Architectural Lighting, by: Egan and Olgyay

Articles

Guys, if you want to read further about retail lighting check these free articles online. Click the link and it will pop- up with these PDF files. Enjoy reading!

Limbic Lighting PDF

Light for Presentation and Reatail – Zumtobel PDF

Fashion – See what light can do for your customers – Philips PDF

Retail Lighting Design Guide – Contech Lighting PDF

Retail Lighting Solutions – Fagerhult PDF

Retail Psychology – SLE PDF

World of Shopping – ERCO PDF

An Application Guide to Retail Lighting – CMBC Lighting PDF

Retail Lighting Guide – Holophane PDF

If you want to add more to this list, just let me know!

Blogs

https://www.shopify.com/retail/

http://retaildesignblog.net/category/store-design/fashion/

Definition of Terms

Click the word to pop-up the linked website. These sites will tell you the best explanations for these terms. Or else, click the blog of LightPro to tell you more about Understanding the key technical terms in lighting design.

Beam Angle
Beam Optic
CCT
Cove lighting
CRI
Floodlight
LED
Light Scenes
Limbic Lighting
Luminaire
Retail Lighting
Retail Shops
Spotlight
Wall washer

About the Author

Nelca Roco

has worked as a lighting designer for more than eight years now in one of the well-known lighting brands in Dubai. She is an architect by profession. She is also a LEED AP certified professional.

She is passionate about sustainable architecture and lighting. She loves yoga, coffee, reading, investing and learning new things. Her ultimate dreams are to: become president, build amazing sustainable architecture and walk on the moon.

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Youtube/NelcaRoco
Slideshare/NelcaRoco
Blogger/NelcaRoco
She gives free lighting design tutorials and lighting design information on her website: www.nrocolightingdesign.com.

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