



Lighting Design considerations and the impact of Lm/W has on energy consumption and ROI.

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Lighting

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Today's presentations will discuss all the various considerations in the design process to reduce the installed power and improve the ROI.

The goal is present you with information that enables you to discuss lighting projects with customers in a different way.

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Project options and why are they important:

- Lighting suppliers and installers play a key role in the overall energy installed.
- Some installations will warrant a lower cost lighting product but if you get to discuss the project with the end user they will care about energy consumption.
- Lowering carbon emissions.

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Lumens....

Watts....

Lm/W....

Lux Level....

Uniformity....

Space to Height ratio....

Lighting Distribution....

Energy cost p per Kw/H....



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Lighting Design considerations

- **Selecting Lux Level** (light falling onto surface).
- Size of space
- Lumen output
- Reflectance's



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CIBSE recommendations for Offices

- 300 Lux for Screen based work
- 500 Lux for Paper based work

**Most offices are 20-40% over Illuminated



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CIBSE recommendations for Racking Aisles

- 150 Lux recommended for large and medium items
- 300Lux recommended for detailed picking

**Most racking is 50% over Illuminated.



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Selecting the correct Lumen Output

- What is Lumens?

The international (SI) unit of luminous flux. Lumens will become the measure of light output as Watts cannot be a reliable measure due to the different efficacy of light sources and the ongoing improvement in LED efficacy through development.

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Selecting the correct Lumen Output

Taking a typical office 12m x 12m we have multiple option with regards to the Lumen outputs selected to illuminate the space.

- 2000Lm
- 2800Lm
- 3500Lm



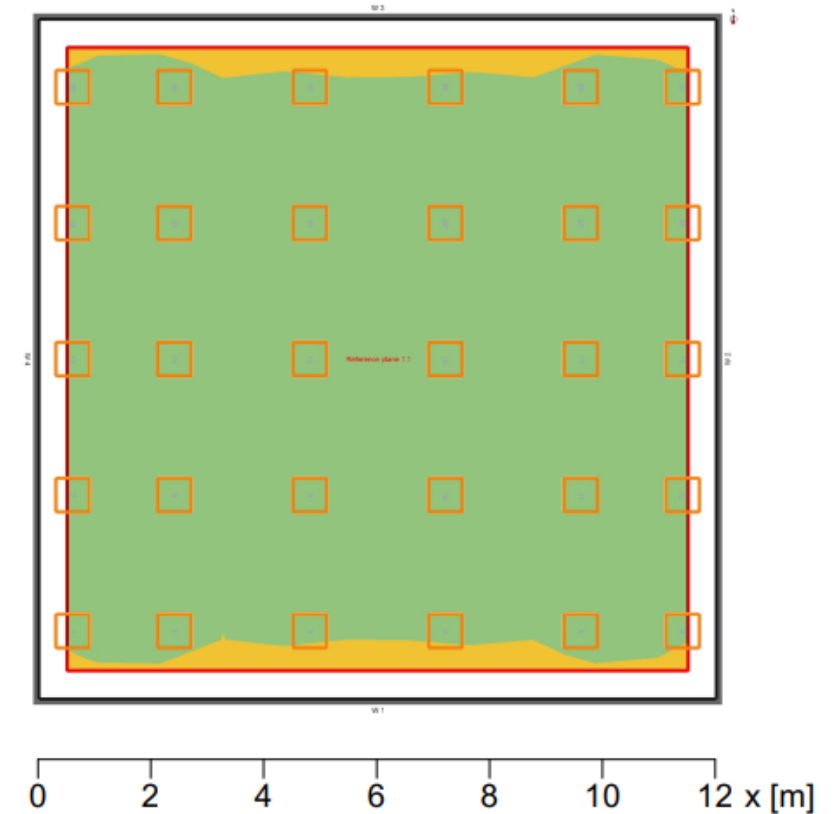
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Selecting the correct Lumen Output

12m x 12m Office space

- 2000Lm
- Installed Power = 450W (15W panel)

=6 rows of 5 = 30 fittings



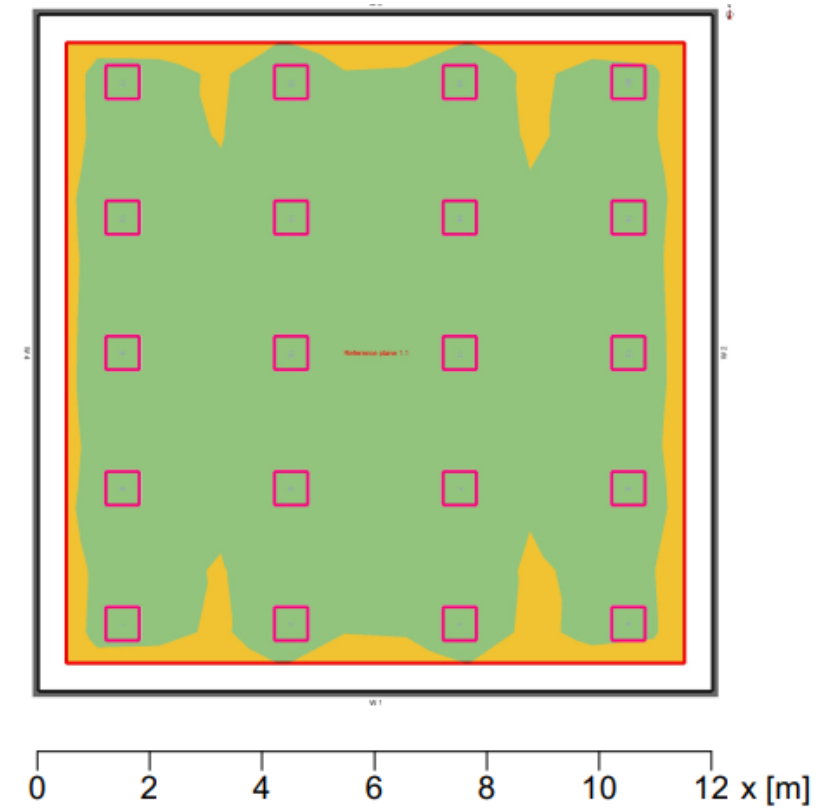
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Selecting the correct Lumen Output

12m x 12m Office space

- 2800Lm
- Installed Power = 420W (21W panel)

=5 rows of 4 = 20 fittings



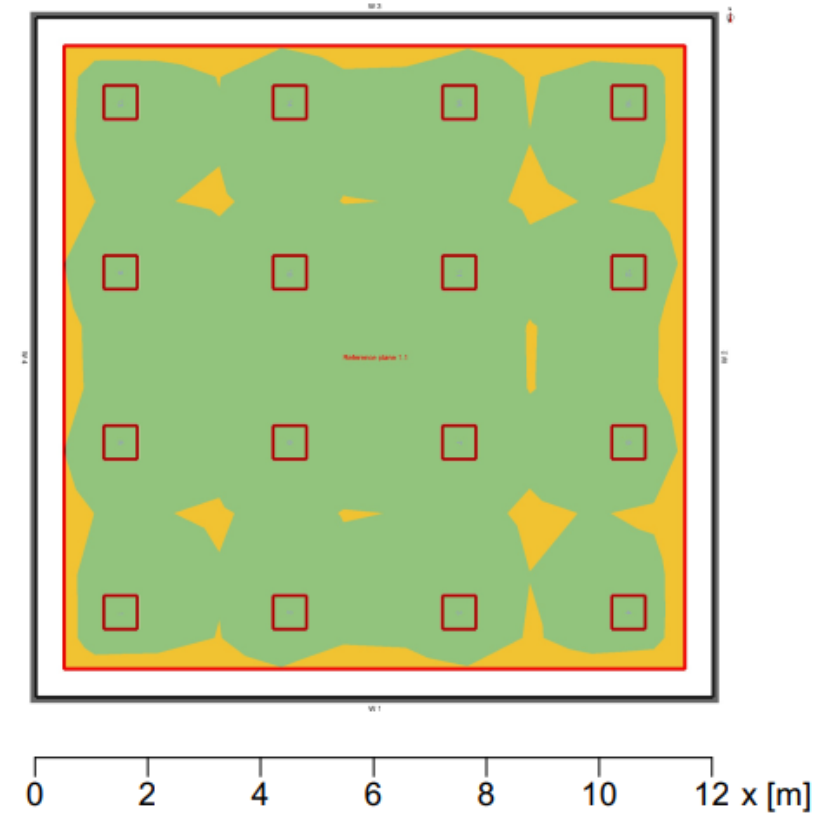
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Selecting the correct Lumen Output

12m x 12m Office space

- 3500Lm
- Installed Power = 416W (26W panel)

=4 rows of 4 = 16 fittings



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What does that mean



Version	4x18W T8	2000Lm	2800Lm	3500Lm
Power	1700	450	420	416
Qty	20	30	20	16
Cost to install		£2,400	£1,600	£1,280
kWh p	20p	20p	20p	20p
Burning Hours	3120	3120	3120	3120
KWh pa	5304	1404	1310.4	1297.92
Energy cost	£ 1,060.80	£ 280.80	£ 262.08	£ 259.58
Energy saving		£ 780.00	£ 798.72	£ 801.22
ROI		3.1	2.0	1.6

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Selecting the correct Lumen Output

Taking a typical racking aisle 20m x 2.5m x 12m High using multiple output options.

So what comes out the best...?

- 16,000Lm
- 21,000Lm
- 30,000Lm



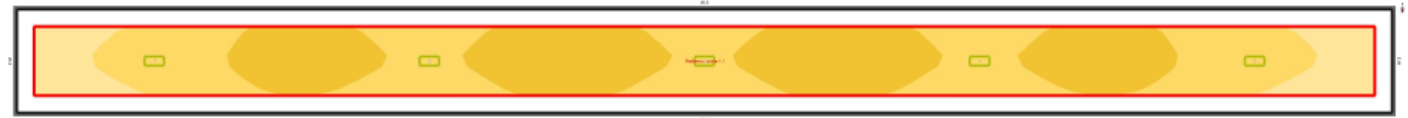
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Selecting the correct Lumen Output

20m x 2.5m x 12M Example racking aisle

- 16,000Lm
- Installed Power = 560W (112W product)

= 5 fittings



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Selecting the correct Lumen Output

20m x 2.5m x 12M Example racking aisle

- 21,000Lm
- Installed Power = 620W (155W product)

= 4 fittings



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Selecting the correct Lumen Output

20m x 2.5m x 12M Example racking aisle

- 30,000Lm
- Installed Power = 720W (240W product)

= 3 fittings



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What does that mean



Version	400W MH	112W (16,000lm)	155W (21,000lm)	240W (30,000lm)
Power	35200	11200	12400	14400
Qty (20racks)	80*	100	80*	60
Cost to install		£20,000	£14,000	£12,000
kWh p	20p	20p	20p	20p
Burning Hours	7000	7000	7000	7000
Kwh pa	246400	78400	86800	100800
Energy cost	£ 49,280.00	£ 15,680.00	£ 17,360.00	£ 20,160.00
Energy saving		£ 33,600.00	£ 31,920.00	£ 29,120.00
ROI		0.6	0.4	0.4

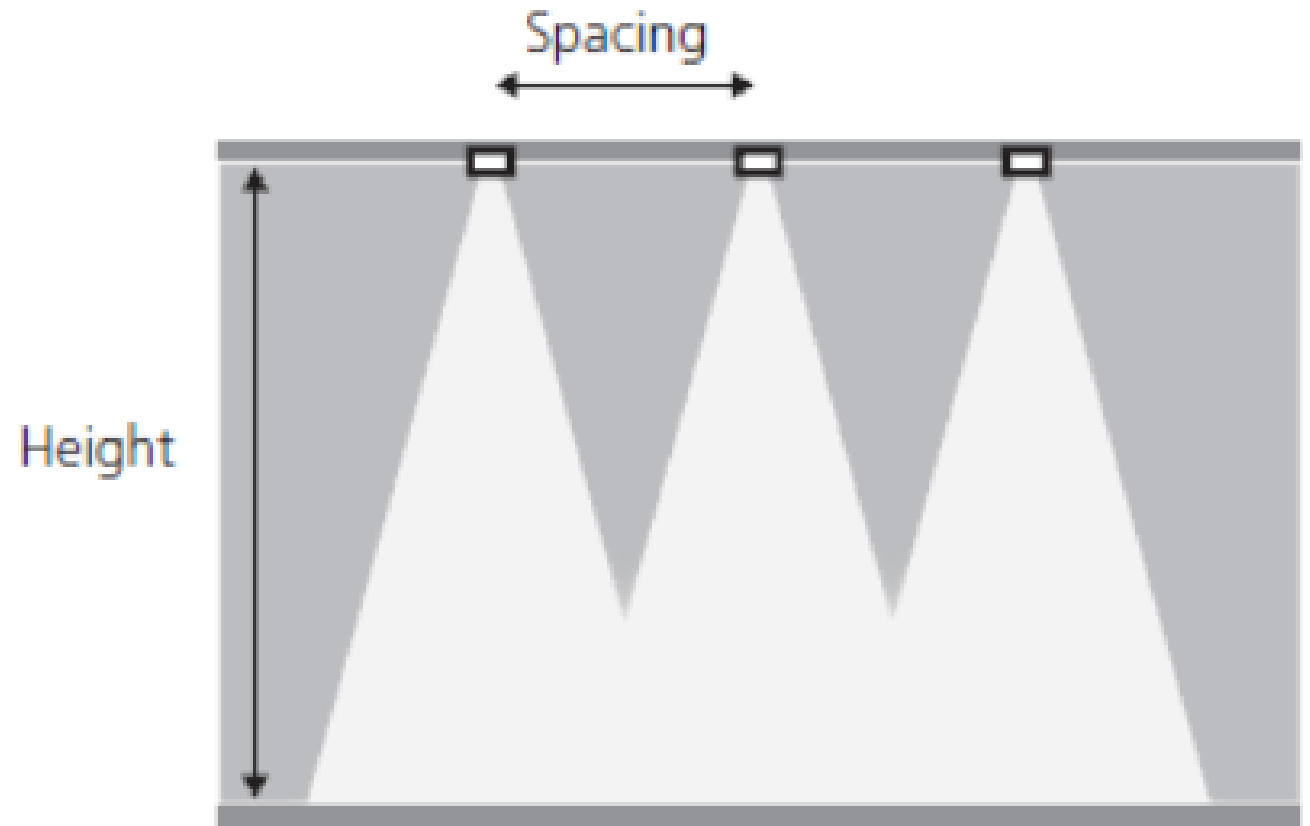
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Design Tip !! Rule of Thumb

Uniformity is important typically the more visually Demanding the task is the higher the uniformity recommendation.

Always try to Achieve 0.5 or 50% uniformity min
With offices or classrooms 0.6 or 60% for room higher
On actual work surface.

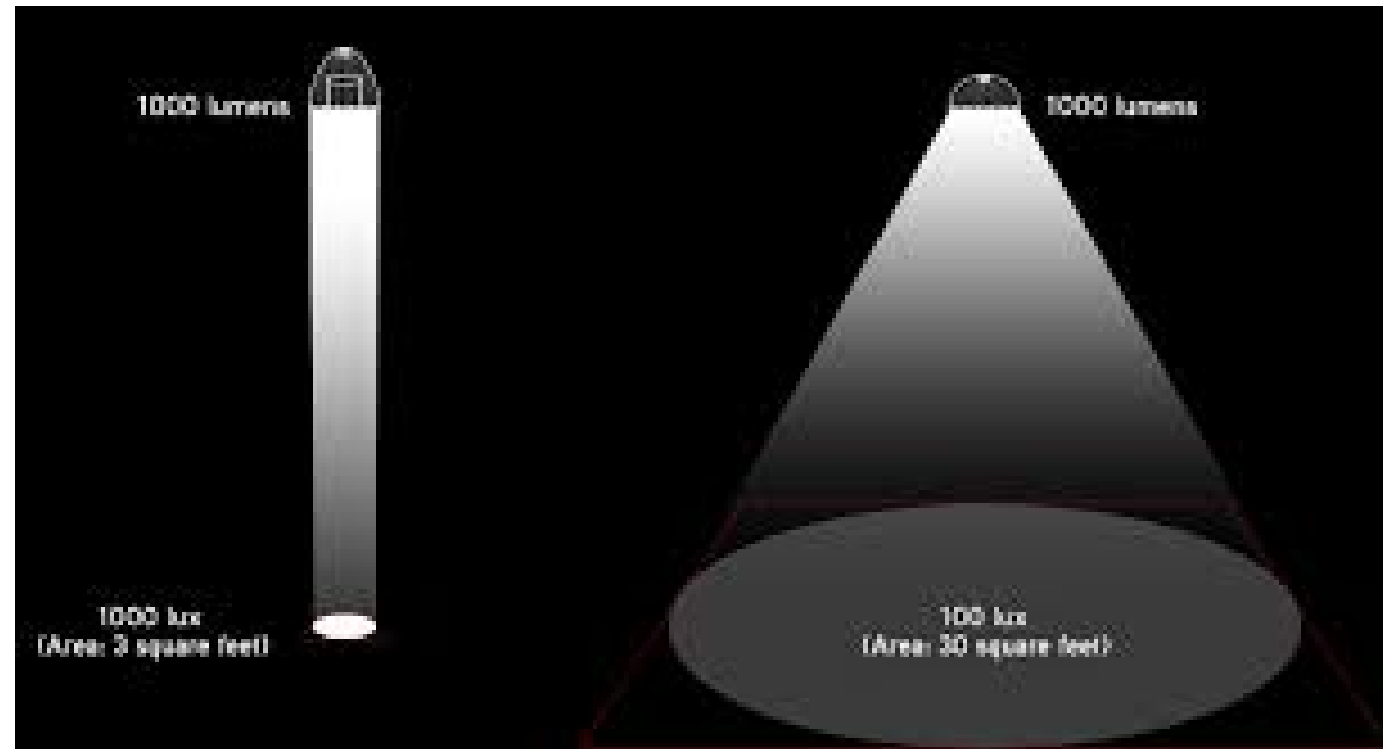
Space to Height ratio = **Approx. 1 to 1**



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Selecting the correct Light Distribution

In certain applications where luminaires have multiple light distributions the overall lighting result, energy consumptions and ultimately the ROI is hugely effected



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Selecting the correct Light Distribution



3 x ELB30RS40 – Rack Lens

Evaluation area 1

Em
Emin

Reference plane 1.1

Horizontal
212 lx
110 lx



3 x ELB30WS40 – Wide Lens

Evaluation area 1

Em
Emin

Reference plane 1.1

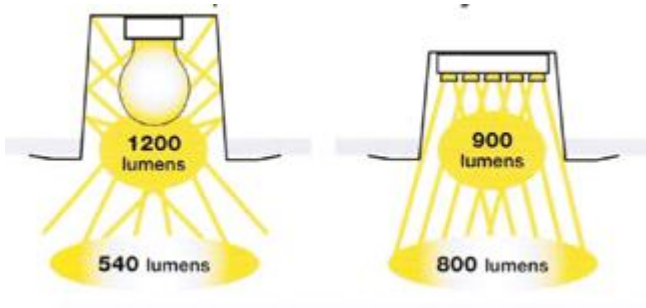
Horizontal
125 lx
80 lx

40% Less Light on working plane

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All Lights are different.

The performance of a light fitting is a direct correlation to the makeup of its components.



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Better performing products

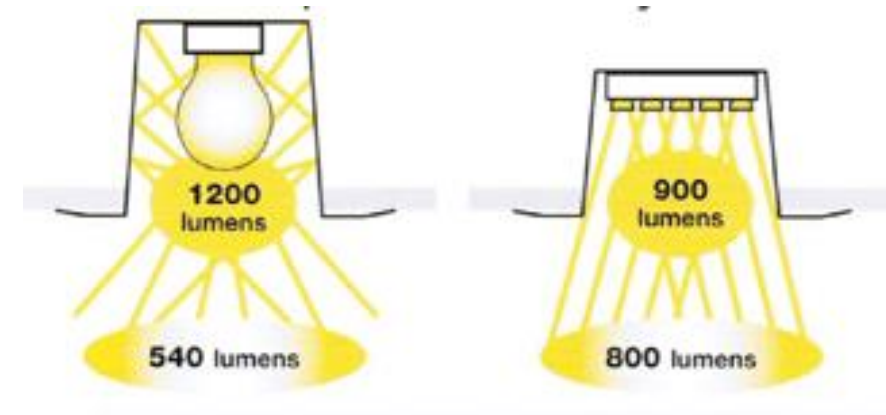
Typically the higher the LM/w the higher quality components.

LEDs – Average raw LED lumens now around 160Lm/W
Best in class 220Lm/W

(£)
(££)

Diffusers – Can block 10-30% of the light

LOR – Internal reflections and product design need to maximise the light output



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Example 100 x Panel office installation

Eco 3500lm Panel @ 100Lm/W

Vs

Premium 3500Lm Panel @ 150Lm/w



Version	Eco Panel	Premium Panel
Power per unit	35	23
Qty	100	100
Total Power	3500	2300
kWh p	20p	20p
Burning Hours	4000	4000
Kwh pa	14000	9200
Energy cost	£ 2,800.00	£ 1,840.00

Saving pa £

960.00

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Example 300 x Weatherproof installation

Eco Linear @ 100Lm/W

Vs

Premium Linear @ 150Lm/w



Version	Eco 6600Lm 5ft	Climate 6600Lm 5ft
Power per unit	66	48
Qty	300	300
Total Power	19800	14400
kWH p	20p	20p
Burning Hours	5000	5000
KwH pa	99000	72000
Energy cost	£ 19,800.00	£ 14,400.00

Saving pa £ 5,400.00

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Summary

Massive amounts of energy can be saved if each component is considered.

1. Selecting the lowest suitable lighting level for the task. (not over lighting)
2. Considering number of points installed and ease of installation.
3. Where applicable consider light distribution
4. Consider the Lm/w of the product installed
5. To maximise energy savings consider Lighting controls

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Thank you any Questions

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