The Importance Of Lighting
The following presentation will give you a general overview of lighting and its importance in the commercial, industrial and retail work environment and how new technology can benefit you in reducing running costs of a property.

Firstly I would like to cover a few terminologies that are used frequently by lighting reps and electricians when discussing and measuring lighting.
What is Wattage, Candela, Lux and Lumens?

- **Wattage** – the power source driving the light disbursed from a fitting i.e. the higher the watts the more light you're going to get.

- **Candela** – is the light produced from a light source which has a reflector.

- **Lumens** – is the light produced from a light source without a reflector.

- **Lux** – is the light delivered to a required area. This is the reading that is most important for you to ensure these areas are meeting OHS and national lighting standards.
Candela, Lumen & Lux

**Candela**
- Measures luminous intensity at the source which indicates the actual amount of light output in a specific direction or where the light beam is directed.

**Lumen**
- Describes the total amount of light in all directions that is radiated/emit by that light source.

**Lux**
- Is the amount of reflected light from a surface. Think of it as if you were in a dark room watching lights at night. Lux is the light coverage on surfaces reflected on the actual surface. The larger the distance to the source, the lower the Lux level will be.
Lighting Level Requirements

The level of light which is measured in lux usually by a light meter to determine how bright each area is. This is done by taking several samples in a given space to get an average which is used to determine the lux in this area.

This is becoming more and more important now with OHS, as WorkCover now performs lighting checks to ensure light levels are of legal requirements in an area where an incident has occurred. Should the area be found to be inadequately lit, WorkCover may refuse a claim and therefore the ramifications could fall back on the property owner due to a non-conforming working environment.
# Lighting Level Requirements

Recommended Lux Levels for various tasks and activities to comply with the Australian Standards AS/NZS 1680.2.2

<table>
<thead>
<tr>
<th>Characteristics of areas and activities</th>
<th>Examples</th>
<th>Recommended illumination (lux)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interiors rarely visited where lighting is only required to aid movement and orientation</td>
<td>Passing through corridors and walkways</td>
<td>40</td>
</tr>
<tr>
<td>Areas of intermittent use for tasks of coarse detail</td>
<td>Movement, orientation and tasks of coarse detail in areas such as change rooms, storage rooms, loading bays etc.</td>
<td>80</td>
</tr>
<tr>
<td>Areas that are continually used for tasks of coarse detail</td>
<td>Simple tasks such as occasional reading of clearly printed documents for short periods or rough bench or machine work in areas such as waiting rooms and entrance halls etc.</td>
<td>160</td>
</tr>
<tr>
<td>Continuously occupied interiors used for ordinary tasks with high contrasts or large detail</td>
<td>Food preparation areas; counters for transactions; school boards; medium woodworking</td>
<td>240</td>
</tr>
<tr>
<td>Areas where visual tasks are moderately difficult and include moderate detail or have lower contrasts</td>
<td>Routine office tasks such as reading, typing and writing in office spaces or enquiry desks</td>
<td>320</td>
</tr>
<tr>
<td>Areas where visual tasks are moderately difficult and include moderate detail and have lower contrasts</td>
<td>Medium level inspection work such as fine woodwork or car assembly</td>
<td>400</td>
</tr>
</tbody>
</table>
### Recommended Lux Levels for various tasks and activities to comply with the Australian Standards AS/NZS 1680.2.2

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<th>Characteristics of areas and activities</th>
<th>Examples</th>
<th>Recommended illumination (lux)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areas where visual tasks are difficult are detailed or of low contrast</td>
<td>Visually difficult tasks including most inspection tasks such as proofreading, fine machine work or fine painting</td>
<td>600</td>
</tr>
<tr>
<td>Areas where visual tasks involve very small detail and very low contrast</td>
<td>Very difficult tasks such as fine inspection, paint retouching or fine manufacture</td>
<td>800</td>
</tr>
<tr>
<td>Areas where visual work is extremely difficult with extremely small detail or with very low contrasts</td>
<td>Extremely difficult tasks that may require visual aids such as graphic arts inspection; hand tailoring; inspection of dark goods; extra-fine bench work etc.</td>
<td>1200</td>
</tr>
<tr>
<td>Areas where visual work is exceptionally difficult with exceptionally small detail and contrast</td>
<td>Exceptionally difficult tasks where visual aids would be of advantage such as the assembly of minute mechanisms and jewellery and watchmaking etc.</td>
<td>1600</td>
</tr>
</tbody>
</table>
Car Parks: General 40 LUX

15 meter entrance
- Day light 800 lux
- Night light 160 lux
Hallways : 160 LUX
Office Tenancy: 320 LUX
Retail: 240-600 LUX
Retail Walkways: 160 LUX
Industrial Workshops

Passage Ways
80 LUX

Workshops
160 LUX

Machine Shops
400 LUX

Electronic and Assembly Works
600 LUX
Colour Tones can make a difference

Colour tones can make a huge difference in any given area. Usually a warm or soft colour tone are for areas such as waiting rooms and bathrooms.

A cool white colour tone what is usually considered an office type of environment.

A day light colour tone which is your brighter colour tone is commonly found in fire stairs, car parks, retail and industrial warehouses.

Medical research has now proven that work requiring high amounts of reading and writing is performed much better under day light colour tones. It has been found to enhance and improve performances especially with students that are required to do a lot of reading and writing.

It’s now proven that where large amounts of reading and writing being done under warm colour tones has decreased performances of individuals and has also shown evidence of causing headaches.
Colour Tones

- 2,200K High Pressure Sodium Lamp
- 2,700-3,000K Warm White Halogen Incandescent
- 4,000-4,500K Natural White Metal Halide
- 5,000-6,000K Day White
- 7,000-7,500K Cool White

- 1,900K Candle
- 2,200K High Pressure Sodium Lamp
- 2,700-3,000K Warm White Halogen Incandescent
- 4,000-4,500K Natural White Metal Halide
- 4,800K Direct Sun
- 5,000-6,000K Day White
- 7,000-7,500K Cool White
- 10,000K Blue Sky
“Medical research has now proven that work that requires a lot of reading and writing is much better under a day light colour tone ...”
Colour Tones

Daylight, Cool & Warm
LED Lighting

Is the most environmentally energy efficient proven lighting technology currently available in all different wattages and sizes for indoor and outdoor lighting to offer a much more cost effective way to run your lighting.

The difference between LED lighting and other lighting currently used to is that LED lighting gives direct light and gives delivered lux. As a result the target you are trying to light up becomes more concentrated to delivering light to the required area resulting in cheaper running costs however, the down side to LED lighting is, because it’s direct light it is only hitting one spot which can result in require more fittings when replacing fluro or halogen fittings. if your changing the current shape of a light fitting to a more spot light driven circular fitting there is a good chance that you will require more fittings to be installed.

LED lighting colour tones are unlike other types of lighting which we are used to. In the past the brighter the colour tone the less delivered lux we had a required work space. Whereas with LED lighting when achieving a whiter light the higher the delivered lux is achieved.
LED Lighting

Energy saving benefits unique to LEDs.
How lighting can reduce running costs of a building

Unfortunately one of the few things we are guarantee in life is that energy prices will go up. As a result the running cost of lighting for a property has now become a much higher expense to maintain which includes power costs, repairs and maintenance and exit and emergency lighting.

By introducing energy saving options into the workplace, you are able to reduce these costs and also achieve a payback period by the savings you will make by introducing these fittings in less than the warranty periods in a lot of cases.
Example: 345 Queen Street
Honeywell research has shown by introducing sensor fittings in the fire stairs, car park and loading docks we have reduce the kilowatt usage from 10,000 hrs to 800 hrs in a year.

Example: 30 Makerston Street
... is another example where by our calculated savings came in better than expected. By reducing their energy bill by over $3,800.00 a month.

Finance approved options are now readily available.

National Australia Bank
A lot of property and facilities managers are now using no deposit no upfront outlays to finance energy efficient options on proven approved products whereby the energy savings received by the client each month goes to the financier until the products are paid off. This maybe a high cost overall however it has cost you nothing and improved your building straight away.
With the support of the Clean Energy Finance Corporation (CEFC), NAB is offering Equipment Finance customers a 0.7% p.a. discount on the funding of qualifying energy efficient assets. That means you’ll enjoy the standard benefits of NAB Equipment Finance including your own tailored repayment schedule and $0 deposit plus, 0.7% p.a. off your finance rate.
## Energy Saving Calculator

<table>
<thead>
<tr>
<th>Lamp Type</th>
<th>Qty Of</th>
<th>lamp</th>
<th>Usage Per</th>
<th>Days Per</th>
<th>Weeks Per</th>
<th>Convert</th>
<th>KW Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT FITTINGS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x 36w T8 fluro troffer (50 off)</td>
<td>50</td>
<td>96</td>
<td>12</td>
<td>5</td>
<td>50</td>
<td>/1000</td>
<td>$ 0.15</td>
<td>$ 2160.00</td>
</tr>
<tr>
<td>PROPOSED LED FITTING:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40w LED flat Panel</td>
<td>50</td>
<td>40</td>
<td>12</td>
<td>5</td>
<td>50</td>
<td>/1000</td>
<td>$ 0.15</td>
<td>$ 900.00</td>
</tr>
</tbody>
</table>
Step 1. Quantity of lights there are in the area you are calculating.

Step 2. Type of transformer running the lamp and add it to the wattage.

Step 3. Number of hours a day they run for, how many days per week and weeks per year.

Step 4. Convert from watts to kilowatts by dividing by 1000

Step 5. Multiply by the KW cost being charged on a recent power bill which requires working out as there are extra charges that you have that must be also included.

Step 6. Repeat the process for the proposed fitting and subtract from the original calculations. Energy savings for above $1260.00

Step 7. Calculate the maintenance costs by allowing for every lamp to be replaced plus labour cost.

Step 8. Calculate cost of electrical repairs which is determined by age of the fittings and has always been 2 - 5%

Step 9. Divide total cost of the Job by your year savings and you will have worked out your pay back Period in years.

This will then determine your pay back period.
Sensor lighting is becoming a much better option for common areas of a property including foyers, hallways, fire stairs and car parks which do not need to be lit when not in use. There are a number of different types of sensors lights available for internal and external usage.

There are many different types of sensors in the market now, and depending on how your lighting is set up in the switchboard and weather it runs off bank of contactors, will depend on the type of sensor system that can be installed otherwise the sensor lights can burnt out in short period of time.

Microwave sensors which are fitted inside a fitting, in my option are the best option available as it individualises each fitting to its own sensor and performs more efficiently.

There are several fittings on the market that offer this technology which has been proven. There are also fittings in the market that do not live up to expectations which I can go into more detail at another time.
Sensor Technology

Stand alone sensors – motion/movement
Microwave sensors in fittings and tubes

**INTRODUCTION TO MICROWAVE REMOTE SENSING**

- Electromagnetic radiation in the microwave wavelength region is used in remote sensing to provide useful information about the Earth’s atmosphere, land and ocean.
- Valuable environmental and resource information can be derived from sensors that operate in the microwave portion of the electromagnetic spectrum.
- It ranges from wavelength of 1mm to 1m. The longest are about 25,00000 times longer than the shortest waves.
Emergency and Exit Lighting

1. Types of Emergency Lighting
2. Requirements for exit and emergency lighting Test
3. Fines associated with emergency lighting not unto Australian Standards
4. Replacing fluorescent tubes in emergency light fittings:
   Retro fitting Emergency light fittings with LED tubes – a HUGE NO NO
Stand Alone Fittings
Are exit and emergency fittings which are independently tested and recorded into an emergency and exit log book. These fittings require a 240v visual check and a 90 battery discharge test.

Self Testing Fittings
The Self-Test circuit utilises an accurate internal clock which is programmed to interrupt the permanent mains supply at set intervals thus initiating emergency lighting tests. The ST units are supplied pre-programmed to initiate short duration tests once every month, a one third duration test after six months and a full duration test once every 12 months.

These results are recorded in an emergency and exit lighting book. These fittings have an indicator light which will flash a different colour if the fitting is faulty. A 240v visual inspection is still required when testing these fittings however the battery discharge test will already have been done and able to be recorded at the same time as performing the 240v test minimising the amount of time spent on site and cost to perform this test.
Monitored Fittings
This system enables the user to manage the entire installation – installing and removing components, testing and monitoring the system and managing maintenance activities thus saving time and money on maintenance.

It operates in real-time, indicating any change of status of network components by changing their icon colour in the Emergency Lighting Monitoring System window. It can test and report on the status of the entire emergency lighting in an installation individually, in groups or all together.

These fittings still require a 240v visual check however like self testing, the battery discharge test will have already been completed which is done automatically by the computer system (building management system) which with some brands can even be retrieved via a smart phone. This system also allows you to print out a certificate that will show that your building has been tested and is compliant should all fittings been tested OK. Otherwise a defect notice with any faulty fittings will automatically be computer generated and logged for rectification. This inspection is usually confirmed by the visual check and should any discrepancy be found, then a second manual test is carried out for clarification.
Types of Emergency Lighting

- **Stand Alone**
- **Self Testing**
- **Monitored**
STANLIGHT Log Book Testing

EMERGENCY AND EXIT LIGHTING MAINTENANCE LOG BOOK

Stanilite®

Thomas & Betts
Australian Standard AS2293.2 – Emergency Lighting Testing & Inspection

The Standard sets out the periodic inspection and maintenance procedures which are necessary to ensure that emergency evacuation lighting systems will be in a state of readiness for operation at all times. It applies to central and single-point emergency lighting systems, as defined in AS/NZS 2293.1.

The Standard instructs that all Emergency evacuation lighting systems shall be inspected and maintained in accordance with the relevant procedures specified in the Australian Standards and that inspections and maintenance procedures shall be carried out only by persons having qualifications and experience suitable for this type of work.

All maintenance records must be in the form of hard copy record tags or log books. Electronic copies may also be used.
Six Monthly Tests

- All emergency luminaires and exit signs shall be checked to ensure that they function satisfactorily. Any defective lamps shall be replaced and a match of lamp technology and lamp colour must be used.

- Where manual discharge test facilities are provided, the following procedure shall be carried out to check the operation of the emergency lighting system:
  
  - Turn the battery charger off, simulate a mains failure and carry out a partial Discharge test at 100 percent of the installed emergency lighting load. Allow the test to continue until the operation of all emergency luminaires and exit signs has been checked, this test must meet the AS2293 requirement for a duration of 90 minutes.

- After tests have been completed the tester must restore the system to normal operation, turn the battery charger on and recharge the batteries of each fitting.
Six Monthly Tests

- Where automatic discharge test facilities are provided, a visual check shall be made of the operational status of all emergency luminaires and exit signs by means of the indications given at the controller or associated indicator panel.

- Those units which fail the discharge test must be either repaired and restored to normal condition or replaced.

Twelve Monthly Tests

- As for the six monthly tests and

- Inspect fittings and clean reflective surfaces as necessary

Please note:

- Fines for having inadequate emergency and exit lighting procedures in place in accordance to the Australian Standards for fire and evacuation lighting has increased significantly. Should you find any property that you are currently responsible for that their emergency and exit lighting does not currently comply to the current legislation, then I strongly advise you implement necessary rectifications to ensure that your property does comply with the current standards to avoid such fines in an event of an audit.
Warranties on products

1. What does a warranty include – hrs/yrs

Things to consider:

• What does the warranty actually include: meaning does it include reinstallation, lift gear should this be required, electrical works to remove the faulty fitting and install a new fitting and Commissioning of that fitting on to the building management system should it be required;

• If a fitting claims to have a 20,000, 30,000 or 50,000 hour warranty however only giving a 1 year warranty for that product, make sure to question why this is, as there is only 8,760 hrs in a year which would give you a lot more than a 1 year warranty on that product. If this is the case alarm bells should be going off regarding that particular product.
Things to consider:

• Is the product guaranteed against fatigue – meaning if the light fittings lighting lux decreases or should some of the LED chip components fail to operate correctly, is there a sliding scale at which that fitting is considered faulty and to be replaced? Or does the warranty cover any reduction in the ability to perform correctly as per its specifications will be replaced.

• What is the time frame in which this defect will be rectified.

• Do I have to wait for this fitting to be sent away and tested or is one resupplied without fuss.
Everything Lighting & Electrical

LET THERE BE LIGHT

time doesn’t stop … and neither do we

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