APPLICATION WATCHDOG

Open Area High Bay Lighting webinar

Energy Efficiency

Voltimum ANZ

3 September 2014 |

Warehouse Lighting

Choosing a high bay luminaire

Expert Introduction - Presenter 1

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High Bay Options

- Traditionally High Bays for Warehouse spaces had few options – generally one typical style using either Metal Halide (MH) or High Pressure Sodium (HPS) lamps
- Today there are many light source options available all offering different benefits and limitations
- So how do we determine which High Bay technology will give us the best energy efficiency?

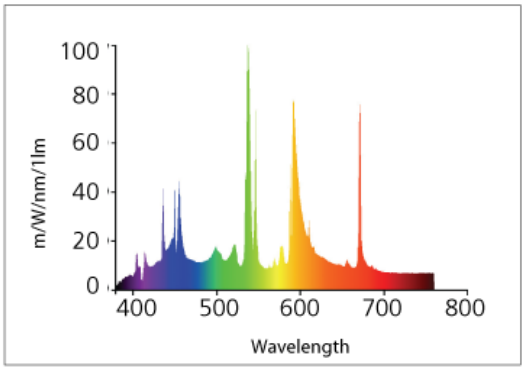
Light Sources

- Let's look at the three most common types of High Bays used today: Metal Halide/Sodium, T5 Fluorescent, LED

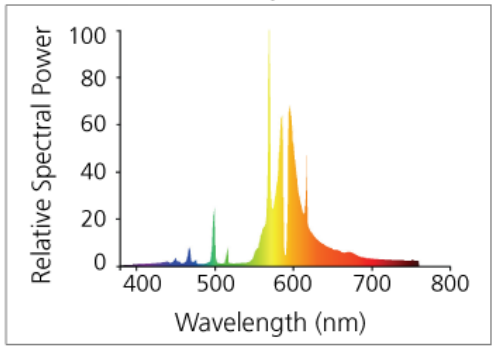
- MH (or CMH)
  - Metal Halide or Ceramic Metal Halide: mature product; various suppliers; many options in terms of power, lamp base, physical size and life
  - For MH: Commonly used 250W or 400W elliptical E40 base giving approx. 20,000lm and 40,000lm resp., 4000K, 70CRI, 15k~20Khrs life
  - For Sodium (HPS): Various powers including 250W and 400W, giving 30,000lm and 53,000lm resp., 2050K (Yellow/Orange), 20CRI, 55khrs life

Light Sources

Metal Halide HSI-T/NDL



Sodium SHP-(T) S Super TwinArc



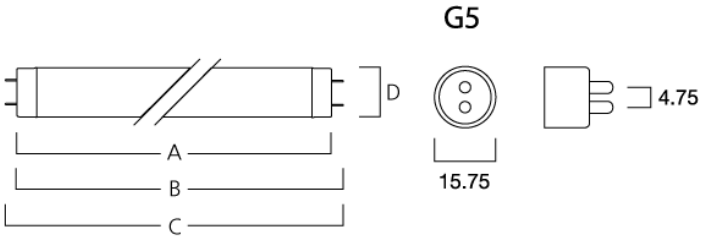
Light Sources

- Fluorescent Tubes: mature light source, available in different shapes and sizes namely T5,T8,T12,T9. T5 are the most commonly used in highbay applications due to high efficiency, small size (diameter of tube is 5/12” or 16mm), relatively long life.

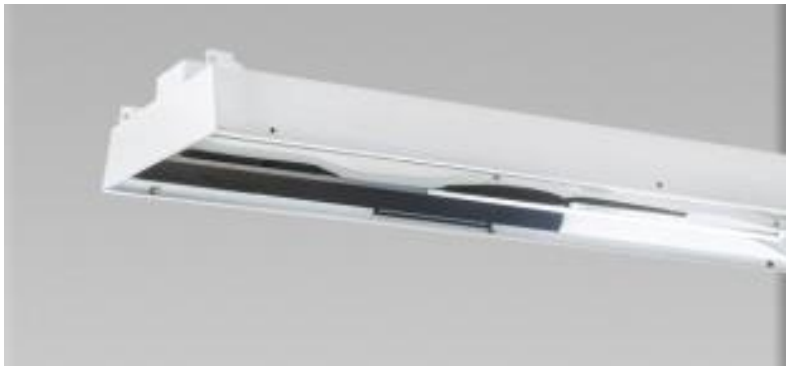
- T5 available in High Efficiency (HE) and High Output (HO) options: HE 14W (1200lm), 21W (1900lm), 28W (2600lm), 35W (3300lm). HO 24W (1700lm), 39W (3200lm), 54W (4400lm), 80W (6100lm).

- Lifetime approx. 24Khrs, various colours 2700K, 3000K, 3500K, 4000K, 6500K, CRI options 70, 80, 90+

Light Sources



	A max	B min	B max	C max	D nom
14W	549	553.7	556.1	563.2	16
21W	849	853.7	856.1	863.2	16
28W	1149	1153.7	1156.1	1163.2	16
35W	1449	1453.7	1456.1	1463.2	16

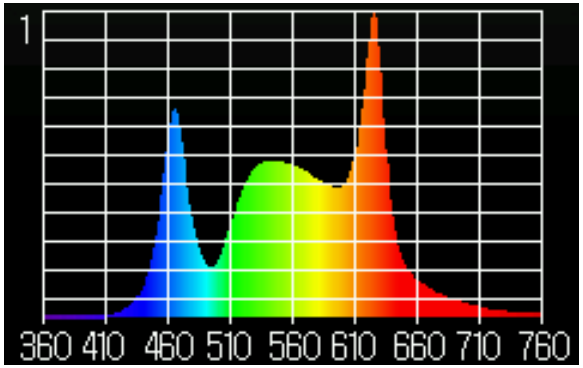


Lights Sources

- LED: almost limitless options for size, colour, CRI, power and efficiency
- Highbays using leds use either a few large LED COB's (Chip on Board) ranging in the order of 40W to 80W COB's, or many High Power LED's such as 1~5W LED's. Lifetimes are around the 50khours to reach a level of 70% of initial lumen output.
- Design's vary in shape and size, but most available LED highbays are made to be similar in light output to the traditional Metal Halide options.

Light Sources

4000K 80CRI LED



Choosing the right option

- As with anything compare your options
- Use a lighting designer to calculate the best fit for your space
  - Just looking at specs on a datasheet may not give you a true indication

Highbay	Lamp Lumens	Exit Lumens	LOR	Total Power	Efficiency	Lamp Life
400W MH	33400	22050	66%	437	50 lm/W	15~20Khrs
6 x 54W T5	26700	24912	93%	340	73 lm/W	24Khrs
250W LED	20099***	20099	100%**	250	80 lm/W	50Khrs

Expert Introduction - Presenter 2

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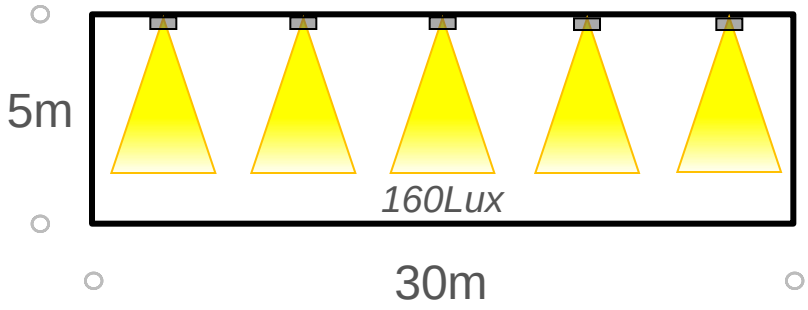
Application Review

High Bay Application 1

- General Area lighting to 160lux e.g. automatic food processing plant
- Ceiling height 5m
- 30m x 30m area
- Ambient temperature circa 25°C

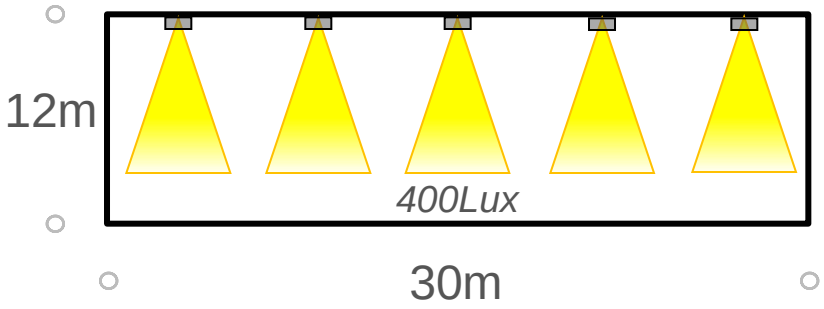


Fluorescent	CMH	LED
Luminaire: ***4 x 54W T5***	**Luminaire:** ***1 x 150W CMH***	**Luminaire:** ***250W LED***
Luminaire power: 234W	Luminaire power: 165W	Luminaire power: 250W
Required Qty: 25	Required Qty: 25	Required Qty: 16
Total power: 5.85kW	Total power: 4.13kW	Total power: 4kW
Lamp life: 20-30khrs	Lamp life: 24khrs	Lamp life: 50khrs

	Fluorescent	CMH	LED
Efficiency	**	****	*****
Capital Cost	**	****	***
Maintenance Cost	**/****	****	****
Controllability	****	**	*****
Glare	*****	****	???
Total	***	***0	***/****

High Bay Application 2

- General Area lighting to 400lux,commonly used in manufacturing
- Ceiling height 12m
- 30m x 30m area
- Ambient temperature circa 40°C



Fluorescent	CMH	LED
Luminaire: ***4 x 80W T5***	**Luminaire:** ***1 x 360W CMH***	**Luminaire:** ***250W LED***
Luminaire power: 344W	Luminaire power: 396W	Luminaire power: 250W
Required qty: 49	Required qty: 25	Required qty: 49
Total power: 16.86kW	Total power: 9.9kW	Total power: 12.25kW
Lamp life: 20-30khrs	Lamp life: 24khrs	Lamp life: 50khrs

	Fluorescent	CMH	LED
Efficiency	*	*****	***
Capital Cost	**	*****	*
Maintenance Cost	**/****	**	****
Controllability	****	**	*****
Glare	*****	****	???
Total	***	****	***

Expert Introduction - Presenter 3

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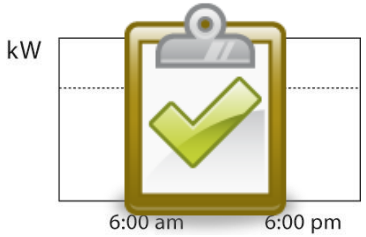
Applying Controls to Industrial Lighting

High bay / Low bay Lighting

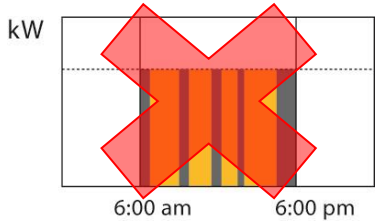
- What do we mean by Controls?

High bay / Low bay Lighting - CMH

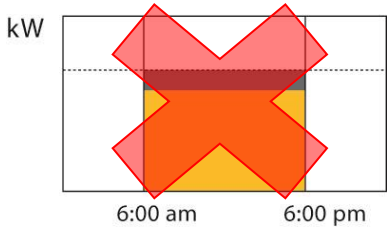
- Personal Control



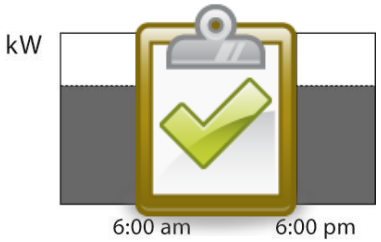
- Occupancy Control



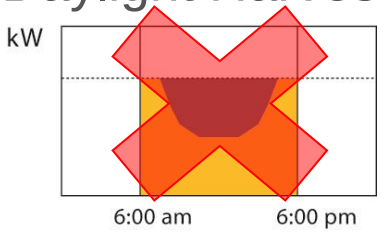
- Task Tuning



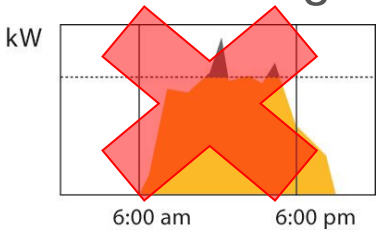
- Time Scheduling



- Daylight Harvesting



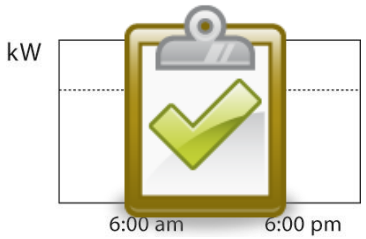
- Load Shedding



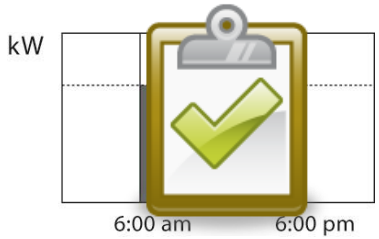
High bay / Low bay Lighting - Fluorescent

- What can we apply controls to?

- Personal Control



- Occupancy Control



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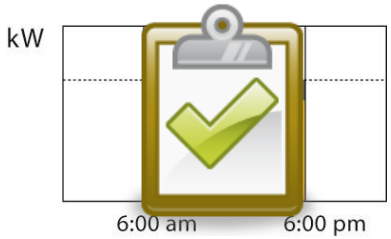
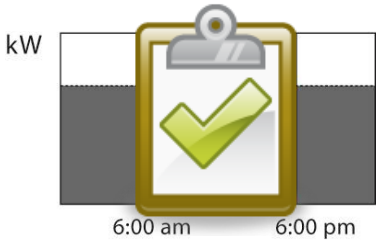
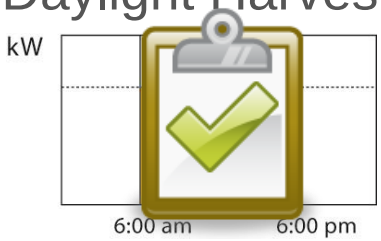


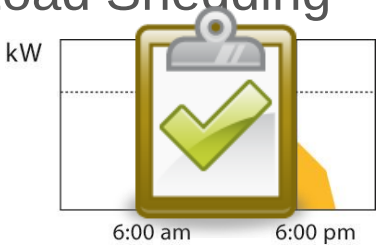
- Time Scheduling



- Daylight Harvesting



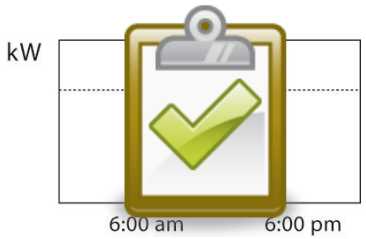
- Load Shedding



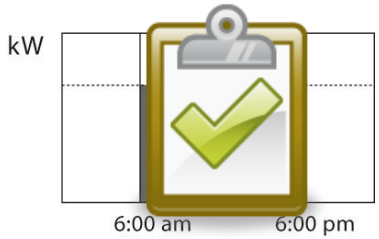
High bay / Low bay Lighting - LED

- What can we apply controls to?

- Personal Control



- Occupancy Control



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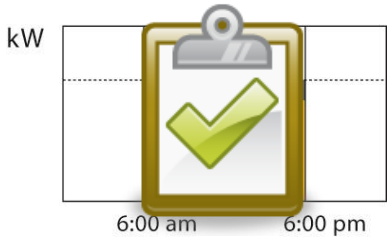

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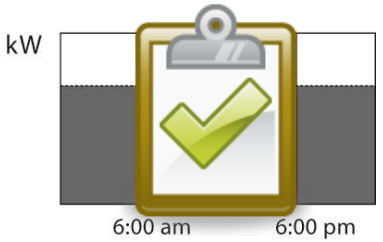

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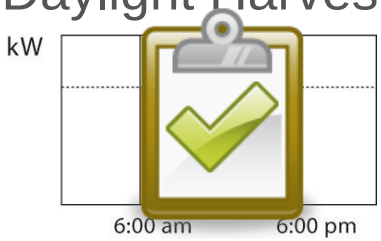

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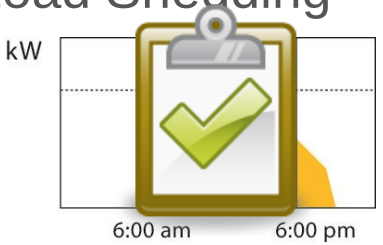
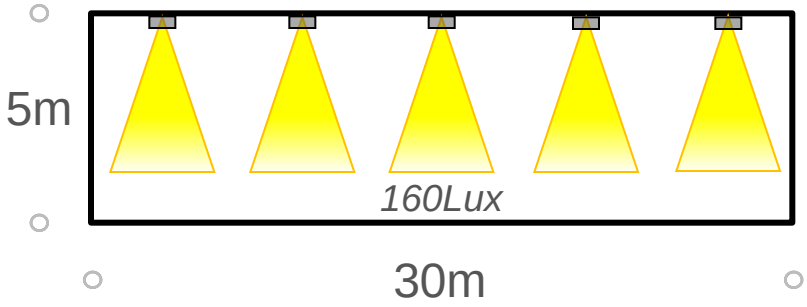


High Bay Application 1



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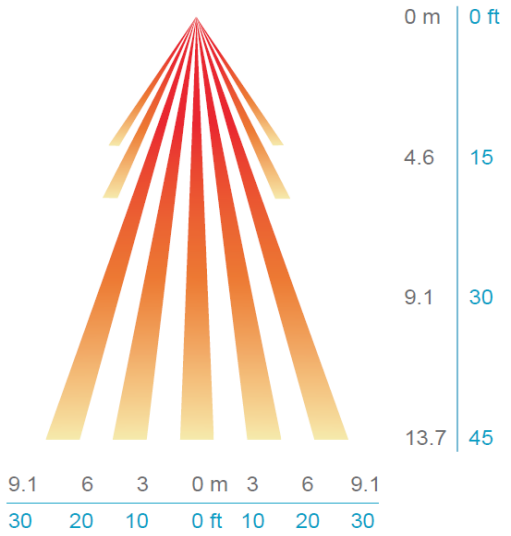
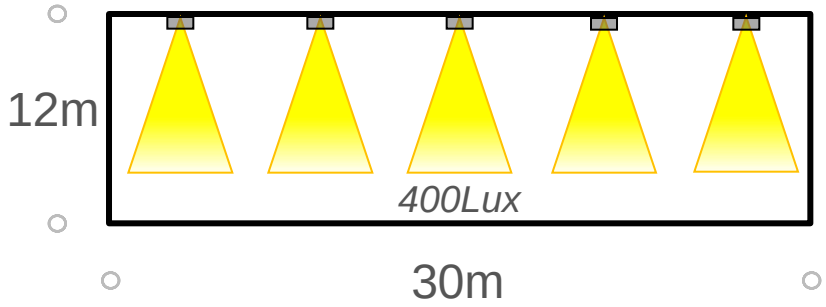
- Ambient temperature circa 25°C



High bay / Low bay Lighting - LED

High Bay Application 2



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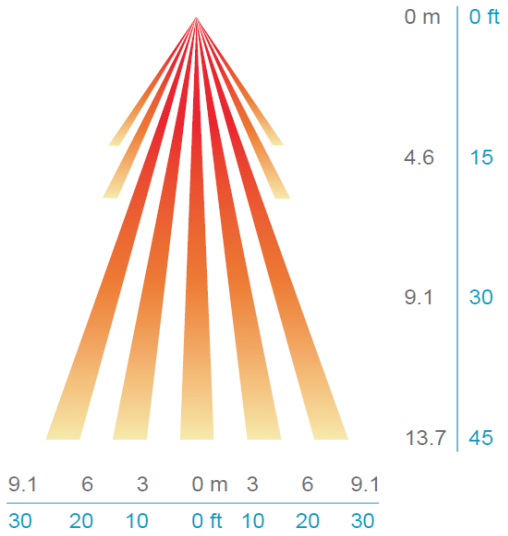

Do you have questions?

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