Lighting Technology for Commercial Building

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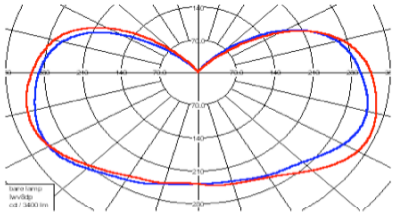
Watt (Input)

Lumen

Generation Of Light

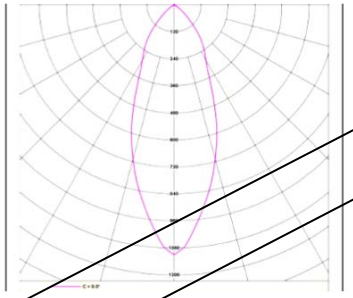


visual sensation (output)

Luminance

Distribution Of Light

Candela



Reflection of Light

Design of Light

Working Plane

Iluminance

Energy Dimension

Environment Dimension

Design Dimension

Biological dimension

Technology

Energy Dimension

Need for greater energy efficiency

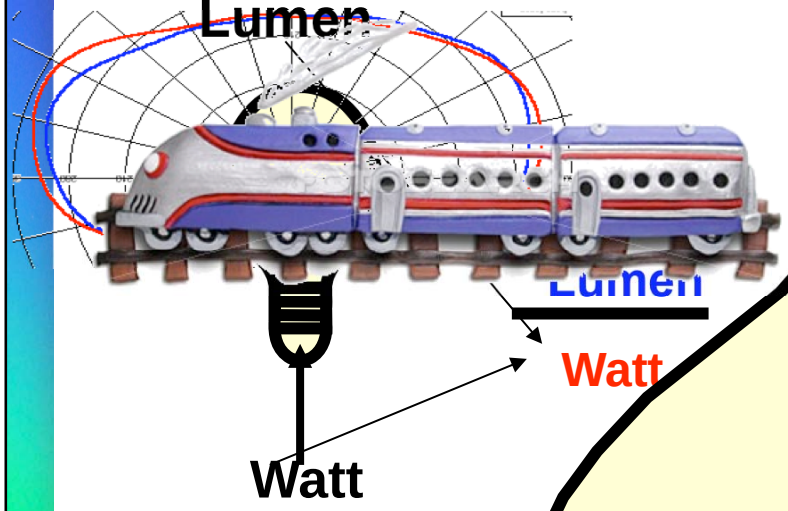
Watt (Input)

Lumen

Principal motivators

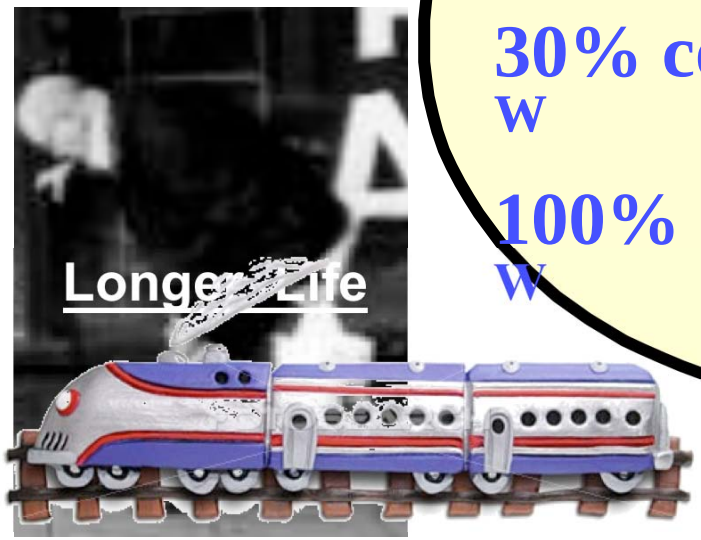
Development in Lighting technology.

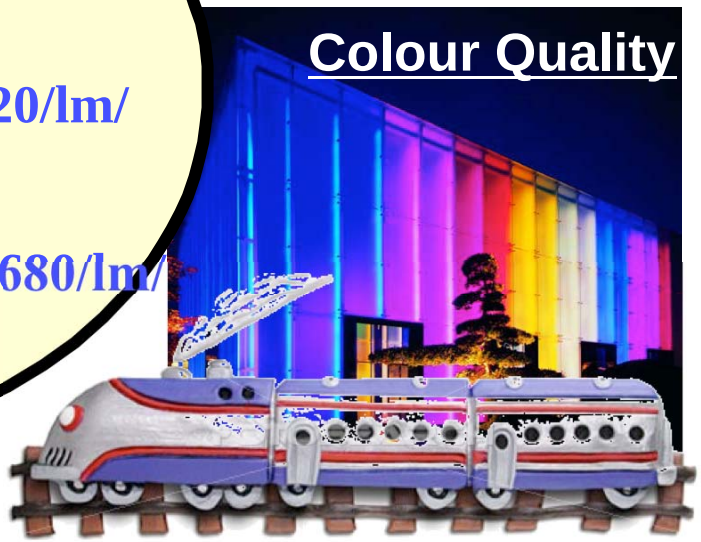
Energy Efficiency



30% conversion---120/lm/w

100% conversion---680/lm/w





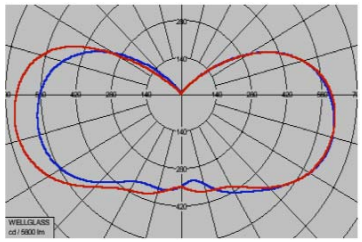
Most probable solution to use combination of these lamps

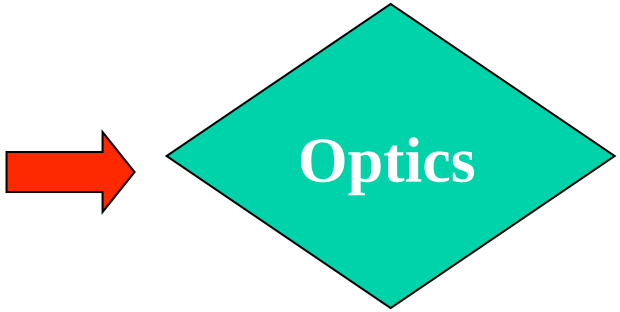
5 star T8

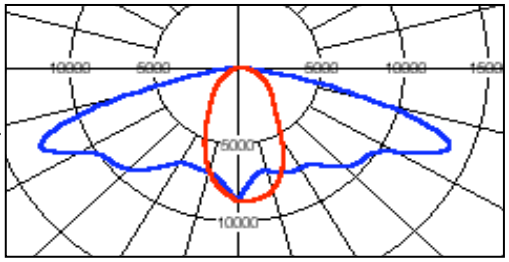
T5

CFL

Luminaire

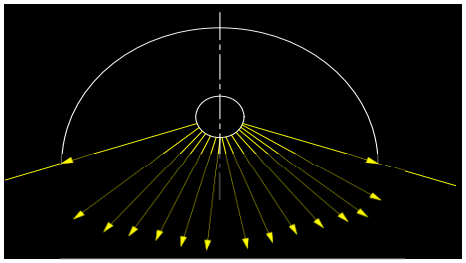


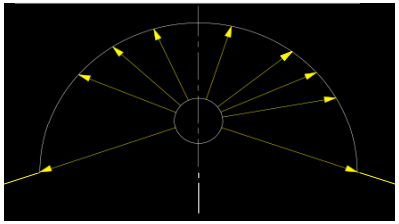


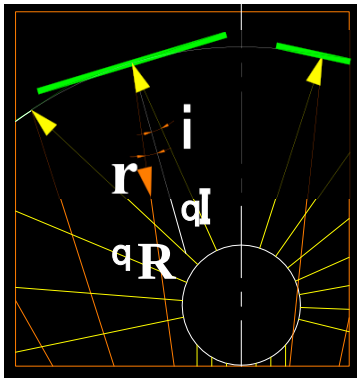


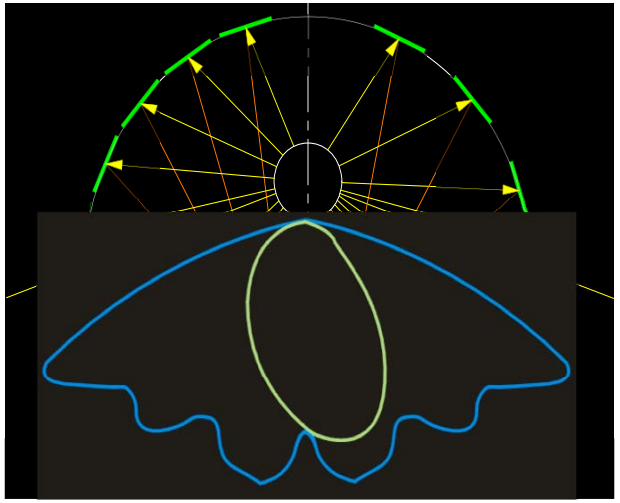
LIGHT DISTRIBUTION FROM BARE LAMP AS INPUT

DESIRED LIGHT DISTRIBUTION FROM LAMP-LUMINAIRE COMBINATION AS OUTPUT



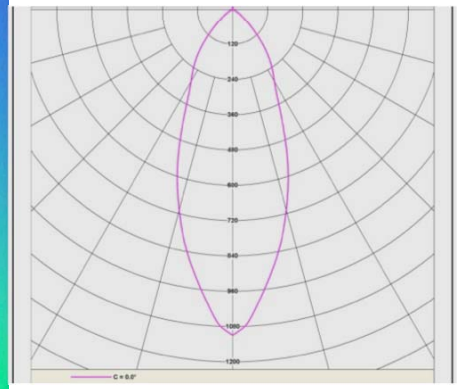




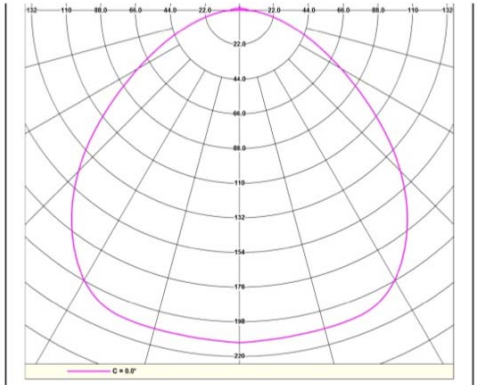


As a result we see different types of light distributions :

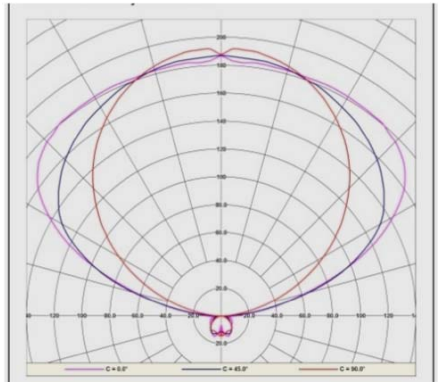
Highbay



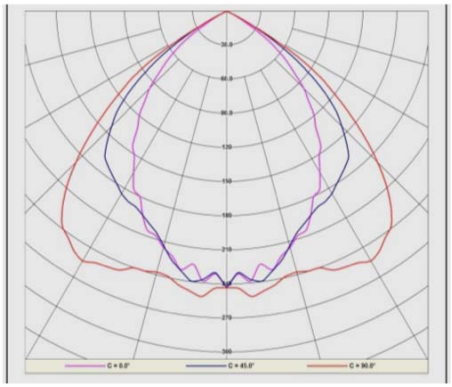
Mediumbay



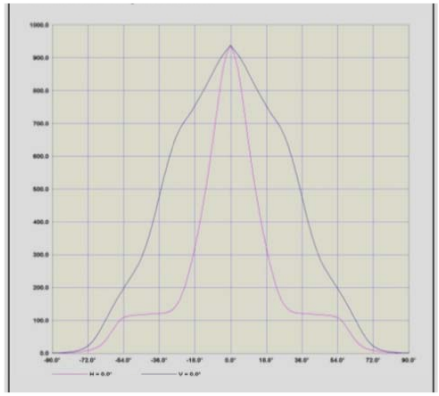
Indirect Type



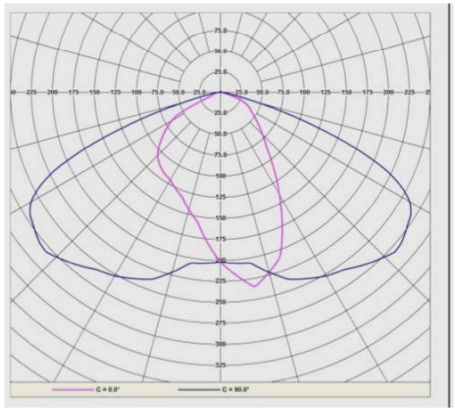
CAT2 Type

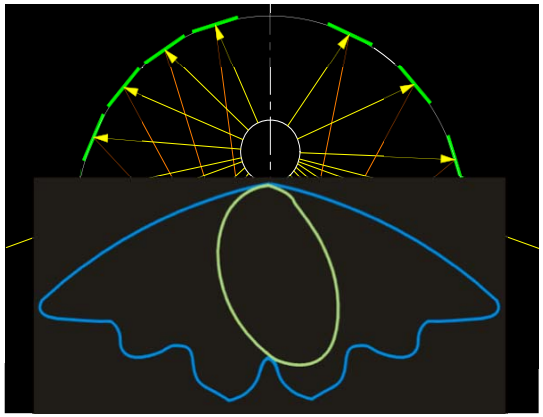


Flood Light



Street Lighting





Luminaire Light Distribution :

CIE (Commission Internationale D'Eclairage) Light Distribution Categories

Direct lighting:	90—100% downward	
Semi-direct lighting:	60—90% downward; 10—40% upward	
General diffuse lighting:	40—60% downward; 40—60% upward	
Semi-indirect lighting:	10—40% downward; 60—90% upward	
Indirect lighting:	90—100% upward	

The CIE provides a classification system based on the proportion of upward and downward directed light output. This system is usually applied to indoor luminaires.

Luminaire Distribution

Semi-indirect

Semi-direct

General diffuse

Direct

Indirect

Electronic Ballast

Dimmable Electronic Ballast
Not manufactured in India !!

Types of ballast

Sr. NO	THD	Remark
1	30 %	PPFC
2	10 %	PPFC
3	10 %	APFC (Constant wattage)
4.	dimmable	Analog/ digital

Ballast Characteristics

1.	THD- Total Harmonic Distortion
2.	Crest Factor :
3.	Lumen Ballast factor
4.	Power delivered/Method of starting
5	High Voltage Cut Off
6.	End life & Spike Protection

Environment Dimension

Pollution and global warming

- For each MWh of electricity we do NOT produce, we eliminate:
  - 680 kg of CO_2
  - 5.8 kg of SO_2
  - 2.5 kg of NO_x


Save
Energy


Reduce
Pollution


Preserve
Natural
Resources

t


Light Pollution

1. Use more efficient Lighting System & Design

2. Light source ----Less Mercury
   : LED + T5+ Low contain Hg T8

Design Dimension

“Design” is the science and art of making things useful to humankind

-- and **lighting design** is the application of lighting—including daylight when it is specifically used as source of lighting—to human space.

Like architecture, engineering and other design professions, lighting design relies on combination of :

- Specific scientific principles,
- Established standards and conventions,
- and a number of aesthetic, cultural and human factors applied in an artful manner.

Light is life.

The relationship between light and life cannot be stated more simply than that.

Lighting ?

It is so ethereal, and yet so important to our lives.

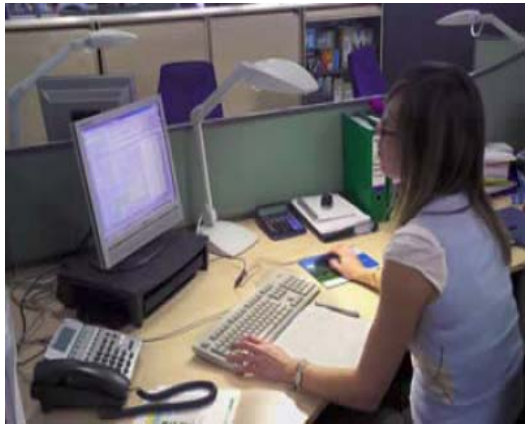
It literally colours our world.

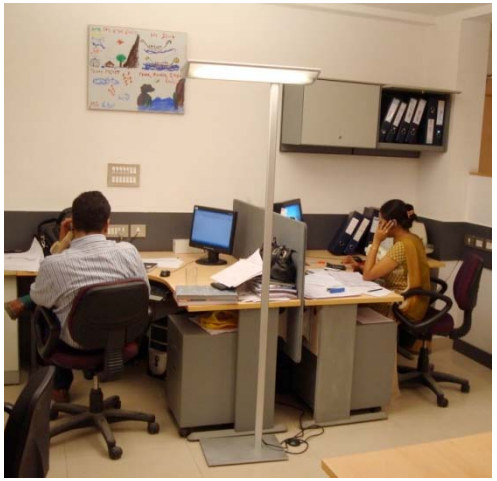
So we write poetry about it.

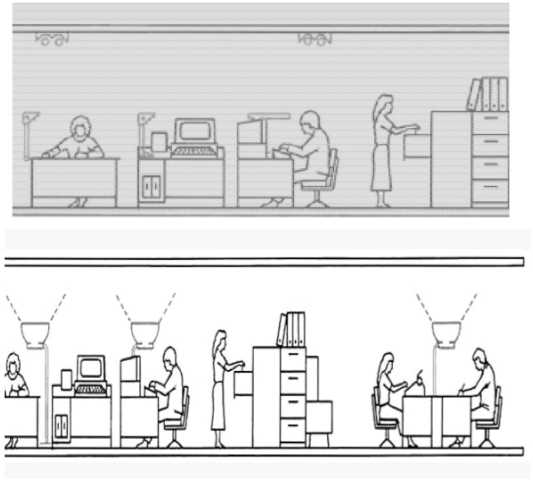
We hono ur great artists who see it and paint it.

Lighting Technique For Office Lighting

Which technique to be used??

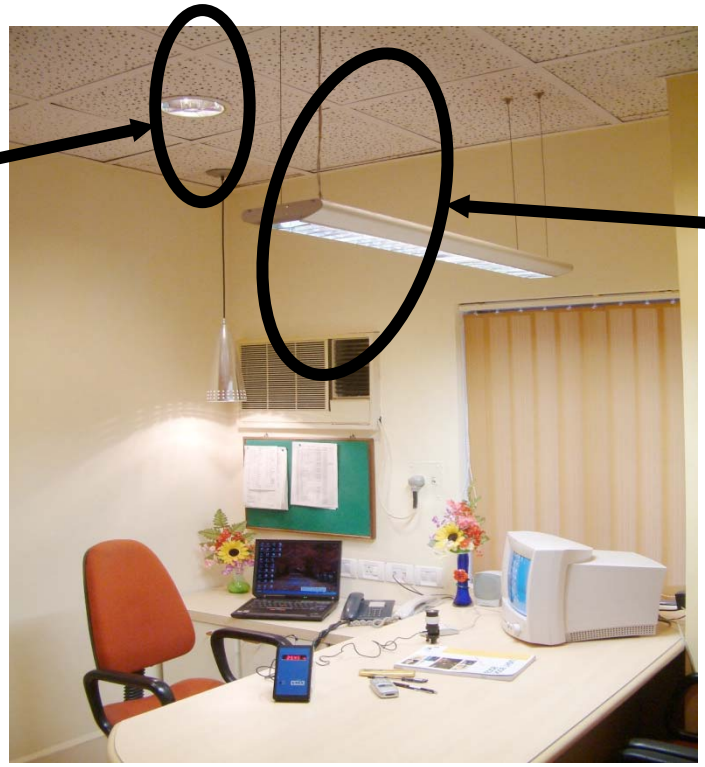






AREA = 12 Sq. m, Lighting Requirement :Lux Level = 350
Power Requirement : 11.8W/m²

1. 2x 18W CFL Downlighter 4No.(with Electro Magnetic ballast):4N0

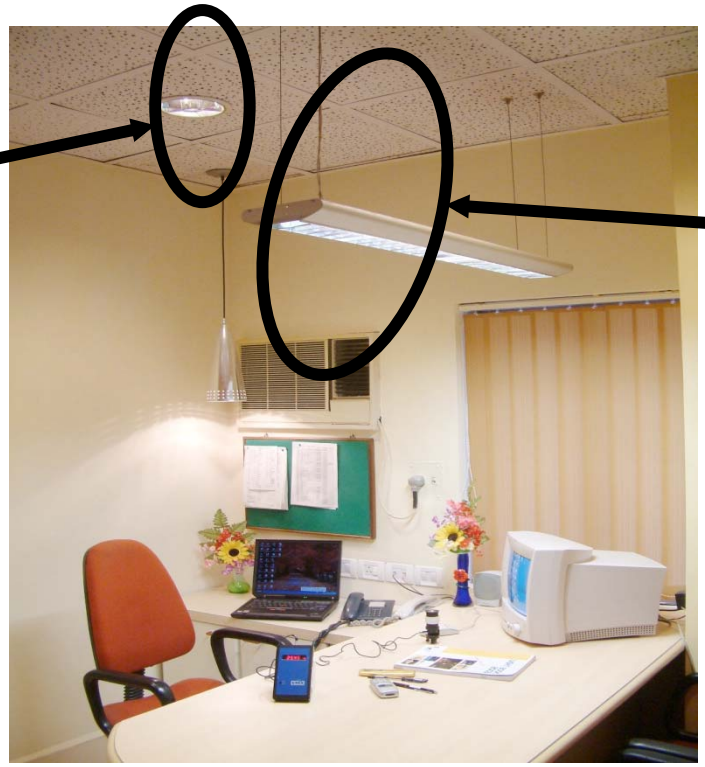


1. 2x36W T8 luminaire with downward light . (with Electro Magnetic ballast.: 1NO.

LPD_1= 23.9W/Sq. m

Lux_1= 370

AREA = 12 Sq. m, Lighting Requirement :Lux Level = 350
Power Requirement : 11.8W/m²



2x 28WT5 HE

1. 2x 18W CFL Downlighter 4No.(with Electro Magnetic ballast):4N0

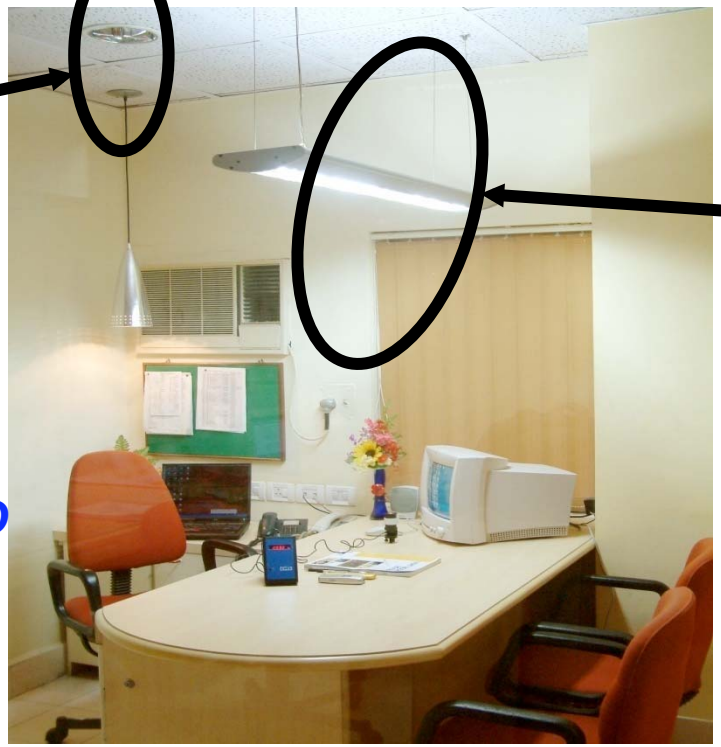
1. 2x36W T8 luminaire with downward light . (with : 1NO. Electrotonic ballast

Electrotonic ballast

LPD_2=18W/Sq. m

Lux_2= 400

AREA = 12 Sq. m, Lighting Requirement :Lux Level = 350 Power Requirement : 11.8W/m²



2x54WT5 HO

1. 2x 18W CFL Downlighter 4No.(with Electronic ballast) -4 NO

Switched off

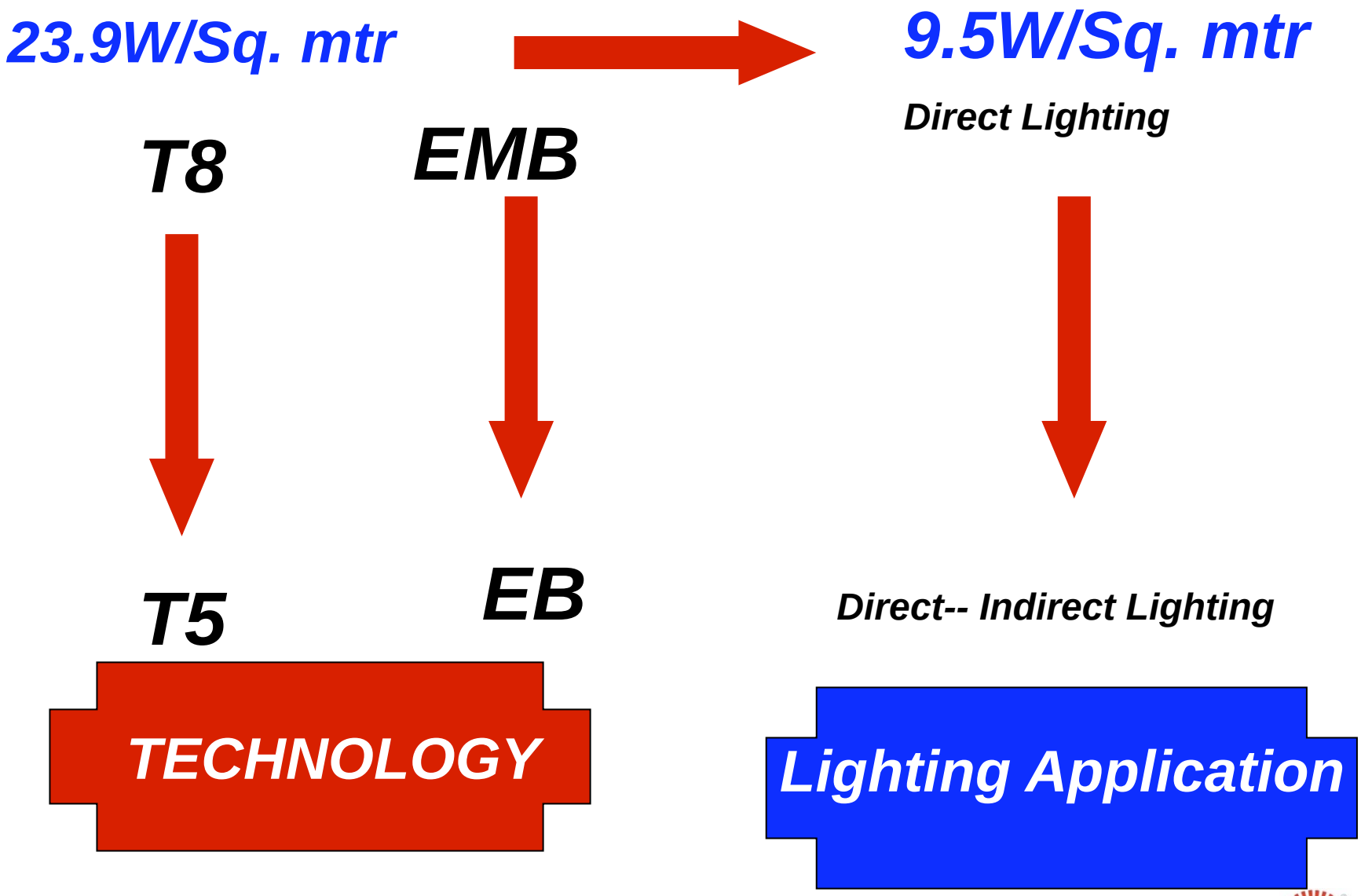
1. 2x28W T5 HE luminaire with downward light. (with Electro nic ballast.: 1NO.

Optics :

Upward + Downward Distribution

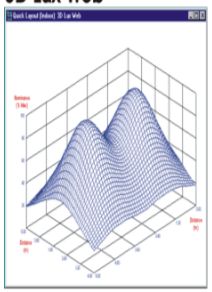
LPD_3= 9.5W/Sq. m

Lux_3= 350

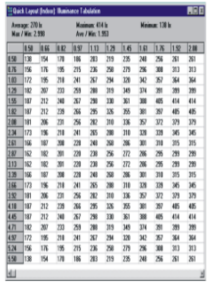

23.9W/Sq. mtr
9.5W/Sq. mtr
Direct Lighting
T8
EMB
T5
EB
Direct-- Indirect Lighting
TECHNOLOGY
Lighting Application

SUNLUX

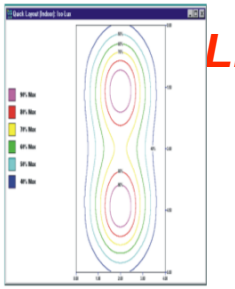
3D Lux Web



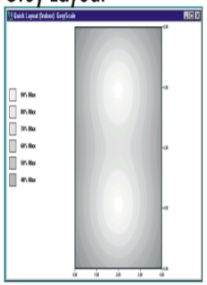
Illuminance Tabulation



Iso-Lux

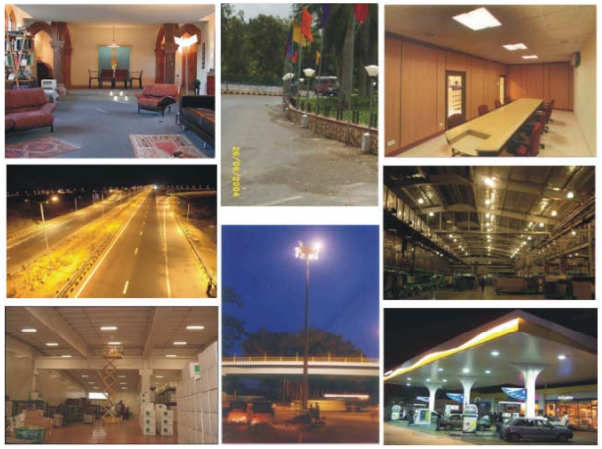


Grey Layout

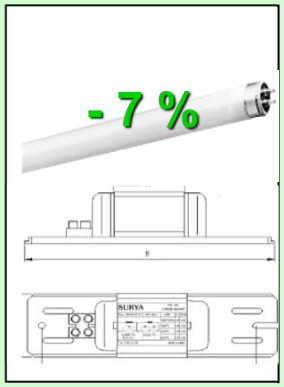


Lighting Design Software

Lighting Design

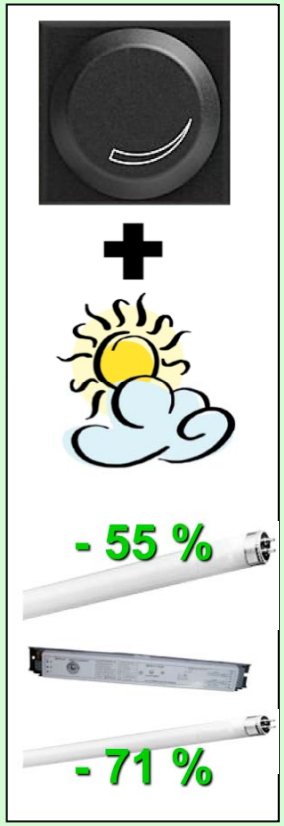


Fluorescent Lamp & Electromagnetic Ballast



Fluorescent Lamp & Low Loss Ballast

Fluorescent Lamp & **Electronic Ballast**



Fluorescent Lamp & **Dimmable** Electronic Ballast

Fluorescent Lamp&Dimmable Electronic Ballast

Dimmable System

Daylight Control

Motion Detector

T8

+

3 band FTL

T5

It will be always struggle between(balance !) creative lighting & Energy efficient Lighting!!!!

Biological Dimension

1. Working on Low Lighting Level can damage our eyes.

2. Science wi… …y yet to develop an equipment …es.

3. Spectacles … …ting and Good lighting is not the su…

Researchers have learned that our biorhythms are largely controlled by light

Darkness typically causes an increase in levels of the hormone melatonin, and corresponding sense of drowsiness

•& cortisol, the stress hormone.---- makes us active during day time

Some people experience seasonal depression, termed Seasonal Affective Disorder (SADD) that can be treated with daily exposure to bright light

More light for the night shift:

Because of the rhythms of our “biological clock”, we make significantly more mistakesat certain times of the day and night.

Many of these are due to fatigue induced by melatonin, the hormone that helps regulate our sleep cycles.

Melatonin is secreted by the human body in darkness, so it isnormally produced at night. This naturallyaffects night shift workers

However, nightworkers do not need to fight the natural need to sleep if their melatonin levels are depressed during the night shift by higher illuminance. 1,000 lx is currently considered sufficient.

Expectation from users!!!

1 Efficient Lighting::

—Energy conservation +Fit & forget Concept ,

2 Good Lighting::

---- Visual & aesthetic need

3 Economical Solution::

--------L1 in Cost

4

But rule of game----------

You can PICK TWO

Not THREE!

Can New Technology

will able to break the rule!!!!


Thank You