



**The Best Products Application Provider
and Mass-Production Supplier**

**Harbor Dedicated 
CLC-LED Lights
Application Introduction**

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Presented by CLC Group

David Lin

Agenda

- 1. Introduction of CLC**
- 2. Milestones**
- 3. The Challenges Overcome**
- 4. Development of CLC G5 Lights**
- 5. CLC Group Advantages**
- 6. Product Portfolios**
- 7. Application Cases**
- 8. Business Model**

Introduction

- **Founded in 1978 in Taiwan.**
- **CLC has been devoted to energy saving products and provided a full range of LED outdoor/indoor lights since 2006.**
- **CLC started to concentrate on developing Harbor Dedicated LED Lights from 2009.**
- **Full series of Harbor Lights (G5) are formed in 2012.**

MILESTONES

1. 1978 CLC Group founded in Taiwan, established trading companies and 3 factories.
2. 1991 Established CLC Technology Group Co., LTD in Hong Kong.
3. 2006 Devoted to LED energy saving products, became a full range of products supplier.
 - LED road/street/garden/fish collection/solar lights and a range of outdoor flood lights and spot lights.
 - LED indoor lights to replace traditional fluorescent lights and various indoor applications.
 - Full range of tunnel dedicated LED lights
4. 2009 Focused on developing LED Harbor Dedicated Lights. Successfully accomplished the trial-installation at the end of 2010 and well accepted by customers. Full series of Harbor Lights were formed in the year of 2012.
5. 2012 G5 series Harbor LED Lights introduced to the market, more than 30 harbors worldwide installed for G5's excellent performance.

The Challenges Overcome

- **Color rendering index:** up to 0.8 (showed on page 6).
- **Color temperature:** CLC uses 2700K \pm 300K to better penetrate heavy fog (showed on page 7).
- **Control Led's astigmatism with secondary optical design, save energy effectively** (showed on page 8).
- **Life:** patented designs of heat dissipation, water-proof, IP 67++, vibration-withstand 1.2 million times (12G) test, and protect circuits which enable the light decay under 30% after 50,000 hours and assure the fixture's life of CLC-LED Lights.
- **Maintenance cost :** maintenance is hardly required during lifetime, greatly reduce parts and labor costs.

Color Rendering Comparison

60



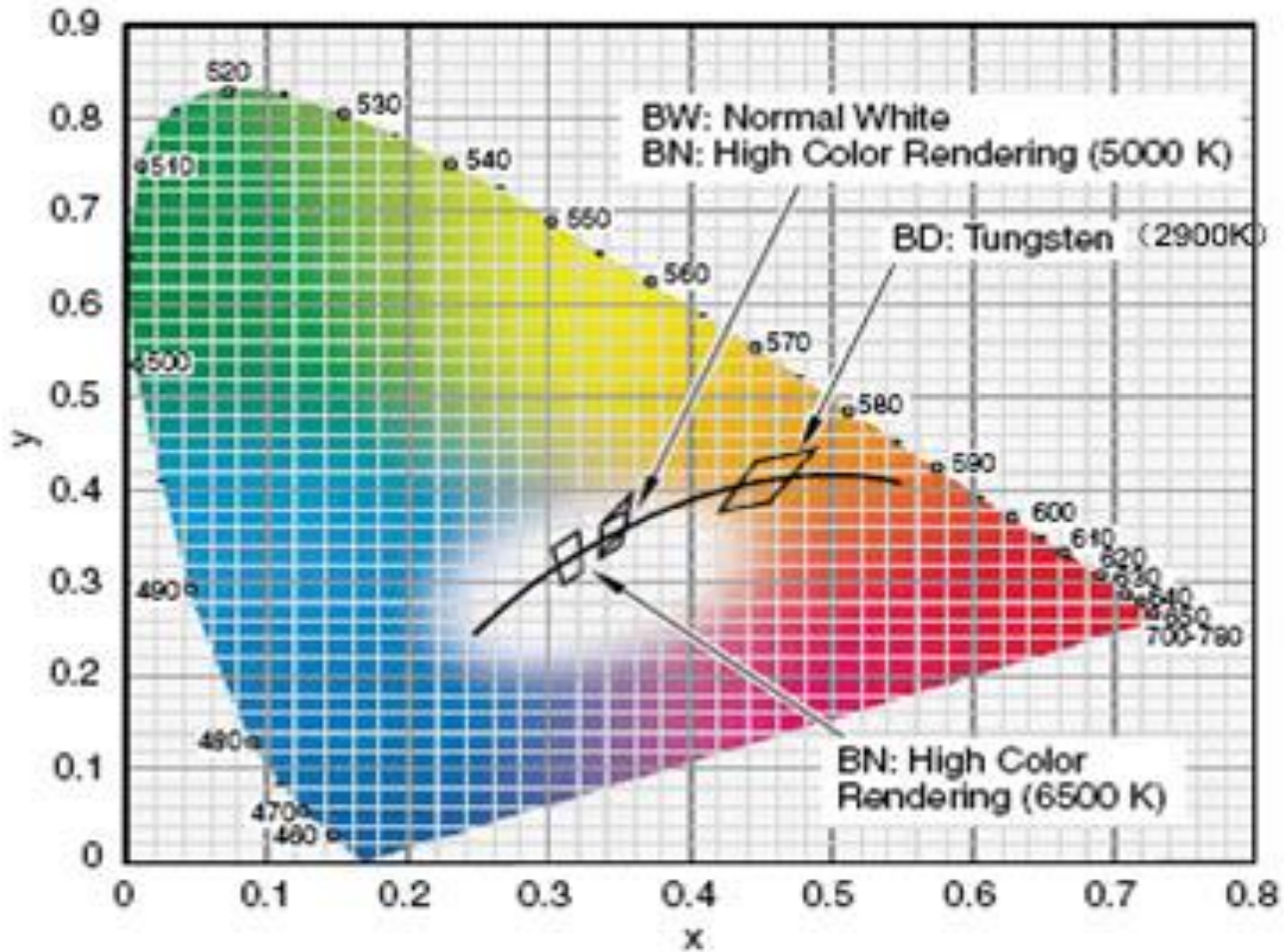
reasonable

80



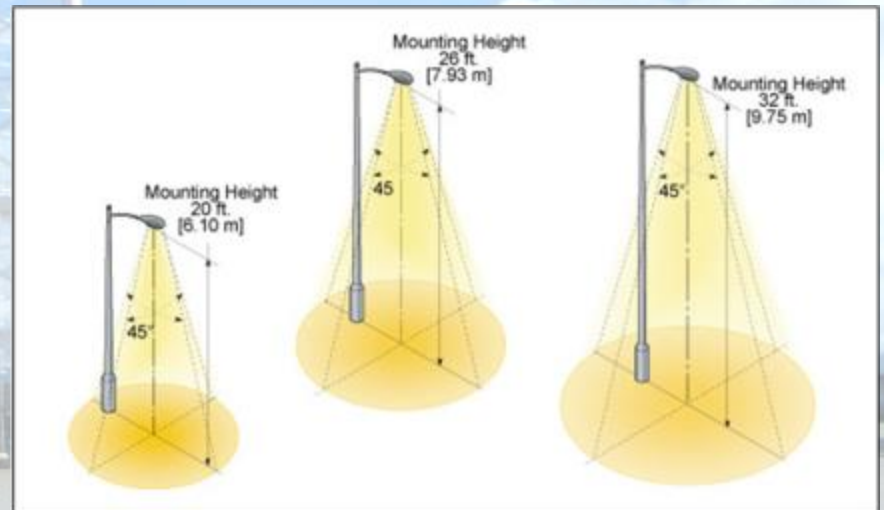
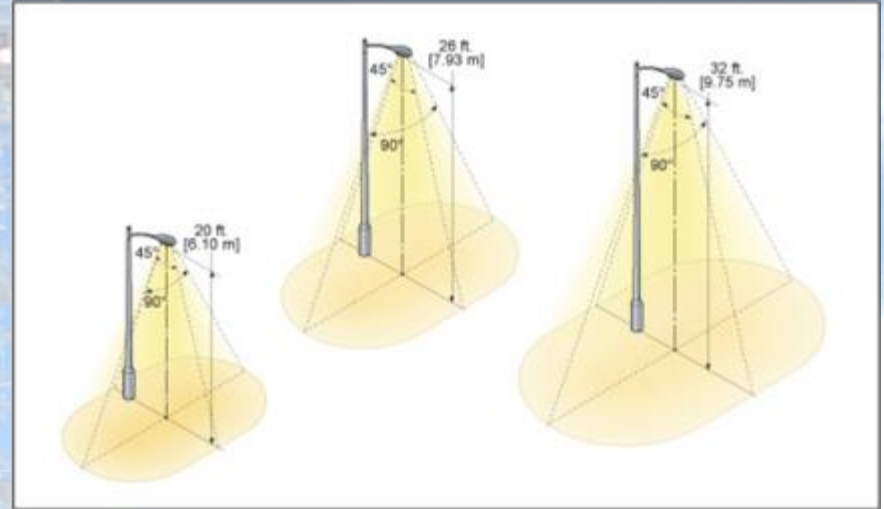
good

Chromaticity Coordinate Chart



LED Lights Aiming To Increase Lighting Performance

- * LED Lights are able to control the lighting direction, to avoid energy waste and light pollution.



Comparison of Different High Power LED Lights In the Market

Item	Picture	Light decay	water – proof, vibration-withstand	Light Distribution	Life	Cost
Modular Type		LARGE	WEAK	POOR	POOR	LOWER
Single COB LED		LARGEST	WORST	NONE	SHORTEST	LOWEST
Multi-COB LED		LARGE	BAD	POOR	SHORT	LOW
CLC Unique Patented Design And Engineering		SMALLEST	BEST	BEST	LONGEST	HIGH

History of CLC G5 Lights

1. From 2009, CLC started to develop harbor dedicated LED lights. 21st Jan. 2010 completed Technical Communication and confirmed Design Proposal. 9th Nov. 2010 installed high tower lights successfully.
2. CLC started to develop harbor equipment dedicated LED Lights from Nov. 2010 and installed on RTG successfully in May 2011.
3. CLC started to develop dedicated Lights for QC from May 2011, introduced G5 lights to the market in May 2012 and installed in major ports around the world.

G5 Series LED lights have the following advantages:

- ★ Full Line Products Support all the Harbor Applications (showed on page 11)
- ★ Life
 - Patented shell , heat conduction & dissipation technology, assure the life of G5 lights.
 - Patented water-proof design (IP 67++) makes G5 lights impermeable.
 - Patented Structure to better withstanding of vibration. Pass Vibration Test 1.2 million times(12G).
- ★ CLC Group applied for 19 patents (awarded 15) for G5 lights and harbor applications. (showed on page 12)

CLC LED Lights Support All Harbor Applications



 CLC Product

Patents

No.	Item	Name	Type	Patent No.	Date	Certificate
1	Heat Dissipation	Nickel plated LED lamp shell	utility model	201220036072.8	2012/2/6	Approved
2		Heat sink with mountatin-shape and wind guide rocks	utility model	201220218526.3	2012/5/16	Approved
3		A LED lamp with graphite substrate	utility model	201220113758.2	2012/3/23	Approved
4	Withstanding-vibration	Lamp angle fixing bracket	utility model	201220218446.8	2012/5/16	Approved
5		Anti-vibration reflecting cup	utility model	201220650359.X	2012/12/3	Approved
6		Abrasion resistance reflecting cup	utility model	201220689002.2	2012/12/17	Approved
7	Water-proof	Water proof cap for lamps shell	utility model	201220235861.4	2012/5/24	Approved
8		Water proof lamp shell	utility model	201220218602.0	2012/5/16	Approved
9	Life	Constant temperature test box for LED lamps	utility model	201220112824.4	2012/3/23	Approved
10	Application	LED moudule can be used individually	utility model	201220650360.2	2012/12/3	Approved
11		LED moudule can be ajusted two-directions	utility model	201220650392.2	2012/12/3	Approved
12		Harbor crane LED lamp lighting distribution	utility model	201220235829.6	2012/5/24	Approved
13		A type of lamp install base	utility model	201220112842.2	2012/3/23	Approved
14		Harbor crane trolley lamp bracket	utility model	201220036074.7	2012/2/6	Approved
15		High tower LED lighting distribution	utility model	201220036050.1	2012/2/6	Approved

CLC Group Advantages

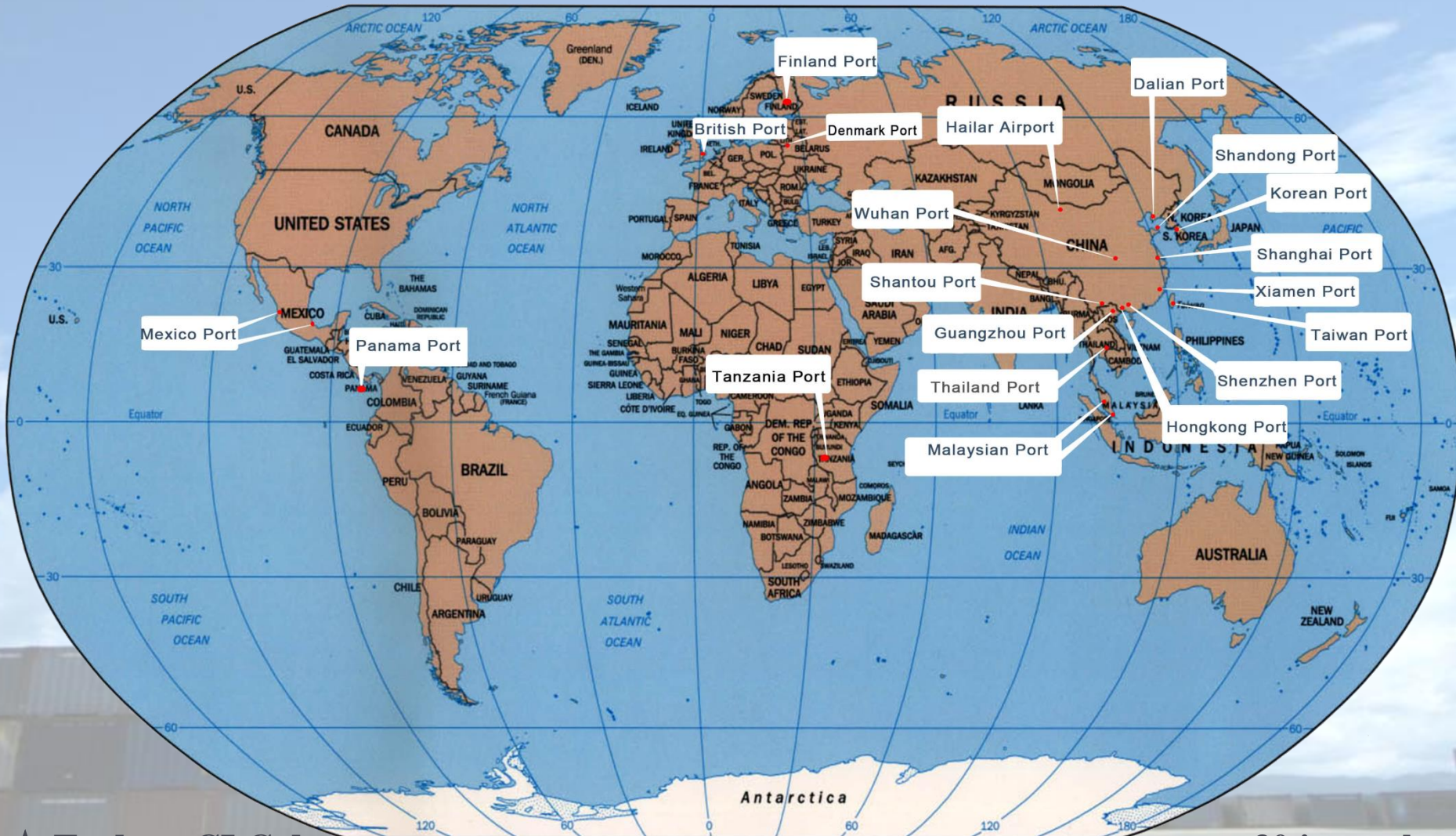
- ◆ Highest energy-saving, up to 90%.
- ◆ 19 patents ensure the best energy saving and life (showed on P12).
- ◆ Harbor Dedicated lights are rapidly promoted to worldwide harbors. CLC's highest installation experiences and widest successful projects (showed on P14).
- ◆ Strong R&D capability makes CLC be able to design new LED Lights quickly according to customers' requirements.
- ◆ Supply full range of LED products for all harbor applications (showed on P15-20).
- ◆ 36 years' experience in electronic products ensures consistent quality and long-term reliability.
- ◆ CLC has followed partnership policy for 36 years. Long-term cooperation is always CLC's strategy.

★Application

★Life

★Responsibility

Focus on Harbor Lighting



- ★ To-date, CLC developed 16 domestic customers and 14 overseas customers, 30 in total.
- ★ More than 20 ports in process. CLC expects to install in more than 50 ports worldwide by the end of 2014.



Product Portfolio (1)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

E(EE)-Series Harbor Equipment Lights



Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%

Model	CLC-LCE-110W	CLC-LCE-135W	CLC-LCE-200W
Input Voltage	AC 90~295V or DC 127~417V		
Rated Power	110W	135W	200W
CCT	2600K-6500K (optional)		
Efficacy	148lm/W		
Color	Brown/Silver		
CRI	Ra>70 (>80 optional)		
Size	385*265*85mm		460*270*87mm
Weight	7.0Kg	7.5Kg	8.5Kg
Bracket	2.0-4.5Kg (Customized)		2.5-5Kg (Customized)

Applications:

Harbor Equipment (key position like operation room, girder, boom of QC, RTG, Ship unloader, etc...)



Product Portfolio (2)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

S-Series Harbor Equipment Lights



Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%

Applications:

Harbor Equipment (Lower location lighting like RTG girder/trolley, conveyor of Bucket wheel stacker, Ship un-loader, Straddle Carriers etc...)



Model	CLC-LCS-60W	CLC-LCS-110W	CLC-LCS-125W
Input Voltage	AC 90~295V or DC 127~417V		
Rated Power	60W	110W	125W
CCT	2600K-6500K (optional)		
Efficacy	139lm/W		
Color	Brown/Silver		
CRI	Ra>70 (>80 optional)		
Size	240*165*75mm	385*265*85mm	385*365*85mm
Weight	2.0Kg	6.9Kg	7.0Kg
Bracket	0.6-1.5Kg (Customized)	2.0-4.5Kg (Customized)	

Product Portfolio (3)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

T-Series PATENT TOWER TWIN LIGHTS



Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%

Model	CLC-LCT-300W	CLC-LCT-400W
Input Voltage	AC 90~295V or DC 127~417V	
Rated Power	300W	400W
CCT	2600K-6500K (optional)	
Efficacy	139lm/W	
Color	Brown/Silver	
CRI	Ra>70 (>80 optional)	
Size	480*540*87mm	480*540*87mm
Weight	18Kg	18Kg
Bracket	2.5-4.5Kg (Customized)	

Applications:

High Tower (pole)lighting for Harbor/Airport/Highway/Sport yard/City square, etc...

Warehouse, gas station, oil depot, High bay light, power plant



Product Portfolio (4)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

K-Series Mobile Machinery Lights



Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%

Applications:

Mobile machineries like reach stacker, Front Loader, hoisting machinery, forklift, roller, bulldozer, concrete mixer machinery, etc ...)



Model	LC-LCK-035W	CLC-LCK-048W
Input Voltage	DC 18-36V or AC 90~295V or DC 127~417V	
Rated Power	35W	48W
CCT	2600K-6500K (optional)	
Efficacy	139lm/W	
Color	Brown/Silver	
CRI	Ra>70 (>80 optional)	
Size	186*165*75mm	
Weight	1.8Kg	2.0Kg
Bracket	0.6Kg (Customized)	

Product Portfolio (5)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

D-Series Mobile Machinery Lights

Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%

Model	CLC-LCD-09W	CLC-LCD-015W
Input Voltage	AC90~295V	
Rated Power	9W	15W
CCT	2600K-6500K (optional)	
Efficacy	145lm/W	
Color	Brown/Silver	
CRI	Ra>70 (>80 optional)	
Size	Φ150*63mm	
Weight	1.1Kg	1.2Kg
Bracket	0.3-0.5Kg (Customized)	



Applications:

Spreader

Product Portfolio (6)



Product Life
50,000hrs

Environment +70°C
Temperature -40°C

Vibration Withstand
1.2 million times

W-Series Walkway Lights

Average Life: 50,000 Hrs; Operating Temp: -40°C to +70°C
Operating Humidity: Up to 100%



Model	CLC-LCW-010W	CLC-LCW-012W
Input Voltage	AC 90~295V or DC 18~36V	
Rated Power	10W	12W
CCT	2600K-6500K (optional)	
Efficacy	139lm/W	
Color	Brown/Silver	
CRI	Ra>70 (>80 optional)	
Size	300*100*67mm	
Weight	1.6Kg	1.8Kg
Bracket	0.5Kg (C-Clamp)	

Applications:

Habor Equipment Walkway Lighting (As QC, RTG, ect...)
Emergency Walkway Light with battery and power backup is available.

Product portfolio (6)

Chart of Illuminance of LED Walkway Lights

Illuminance of 0.8 meter high

Distance	0.3m	center	0.3m	0.5m	1m	1.5m	2m	2.5m	3m	3.5m
Other LED light (12w)	51.2	92.7	61.2							
CLC LED light (12w)	295.5	364.5	263.2	122.2	53.6	16.9	6.2			
CLC LED light (18w)	446.5	532	451	177.9	81.3	25.5	9.3			

Illuminance of 1.5 meters high

Distance	0.3m	center	0.3m	0.5m	1m	1.5m	2m	2.5m	3m	3.5m
Other LED light (12w)	11.2	11.8	10.9							
CLC LED light (12w)	98	108	91	78	40.3	18.5	9	4.5	2.7	1.2
CLC LED light (18w)	155	169.5	151.8	127.5	68	30.5	15.5	7.8	4.2	2.0

Application Case 1: RTG

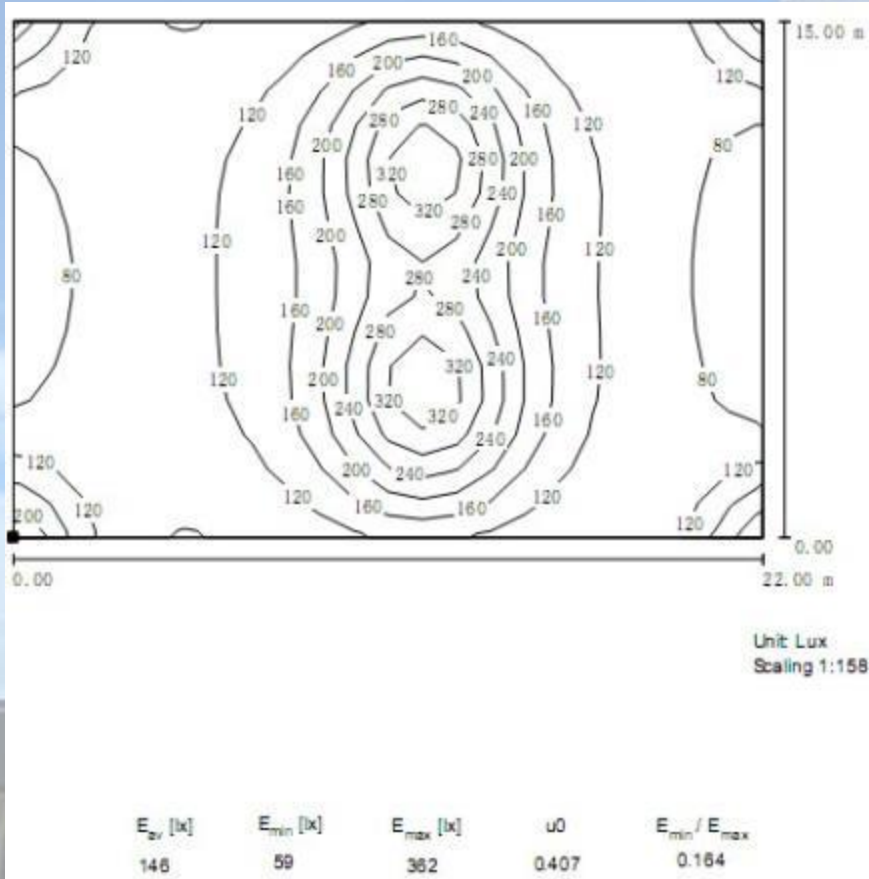


► 1 RTG Energy Saving Rate = $(16*460-12*110-4*60)/(16*460)*100\% = 78.8\%$

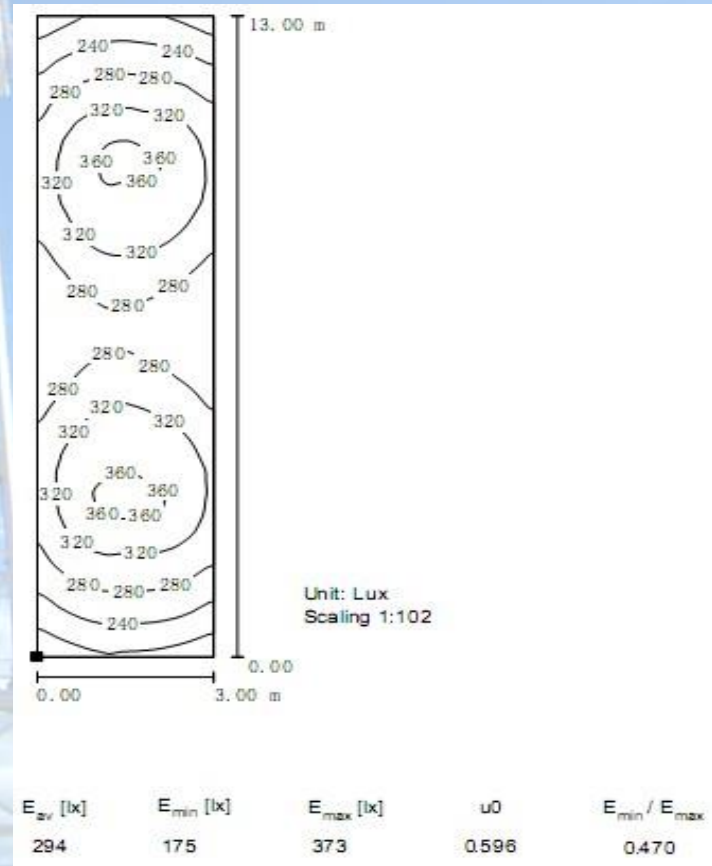
Location	Height (M)	HPS lights QTY (PCS)	HPS lights (actual) Power (W)	CLC-LED Lights Power (W)	CLC-LED Lights QTY (PCS)	Replacement Ratio	Power Saving (W)
Girder	21.5	8	400(460)	110	8	1:1	2800
Trolley	21.5	4	400(460)	110	4	1:1	1400
Leg	5	4	400(460)	60	4	1:1	1600
Total		16			16	1:1	5800

RTG Illuminance Distribution Diagram

Illuminance Simulation Diagram



RTG (3m*13m under trolley) Illuminance Distribution Diagram



RTG Girder Height: 25m, Trolley Height: 21.5m, Tyre Height: 5m

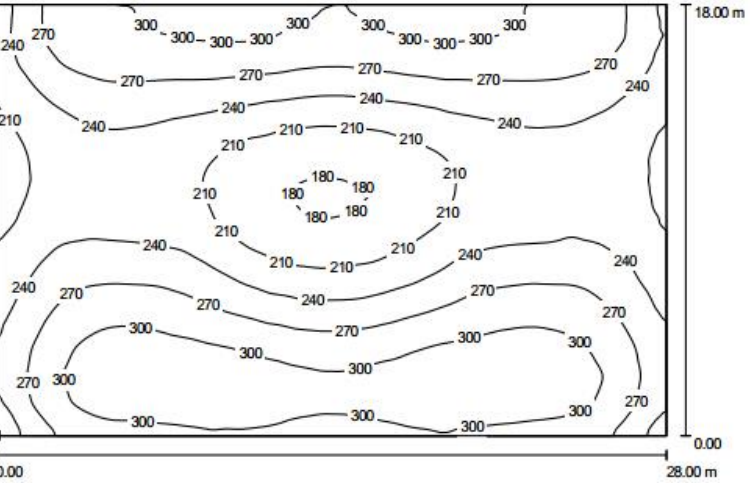
Application Case 2: QC/STS

Location	Height (M)	HPS Lights QTY (PCS)	HPS Lights (actual) Power (W)	CLC-LED Lights Power (W)	CLC-LED Lights QTY (PCS)	Power Saving (W)	Energy saving rate
Trolley	46.2	4	1100	135	6	3590	
Portal	16.2	4	1100	400	4	2800	
High Girder	48	9	1100	400	9	6300	
Boom	48	11	1100	200(400)	16(11)	8900 (7700)	
Above Tyre	5	4	440	110	4	1320	
Total		32	32560	9650 (10850)	39(34)	22910 (21710)	70.36% (66.67%)

► Energy Saving Rate = 66.67%~70.36%

QC/STS Illuminance Distribution Diagram

Land Area Illuminance Simulation Diagram (A-girder + Portal beam)

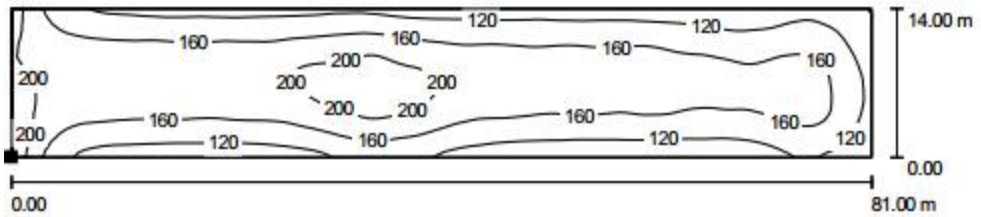


Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
258	175	321	0.679	0.545

Values in Lux, Scale 1 : 201

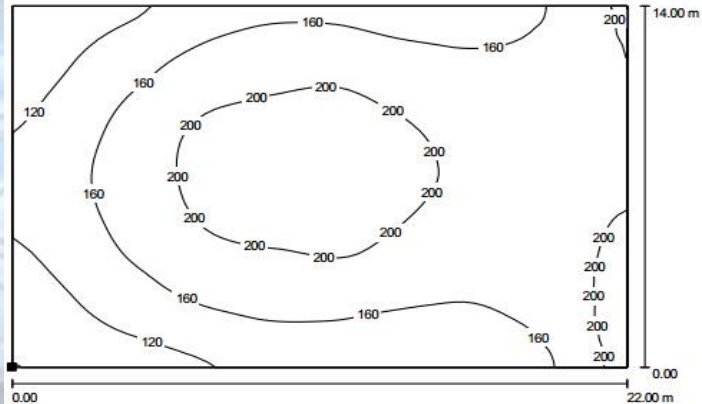
Boom Area Illuminance Simulation Diagram



Grid: 128 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
158	79	229	0.503	0.346

Backreach Area Illuminance Simulation Diagram



Grid: 64 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
171	80	233	0.466	0.341

Illuminance Requirements:

Land area ground average Illuminance (18m) > 250 Lux .

Boom and backreach (14m) > 150 Lux

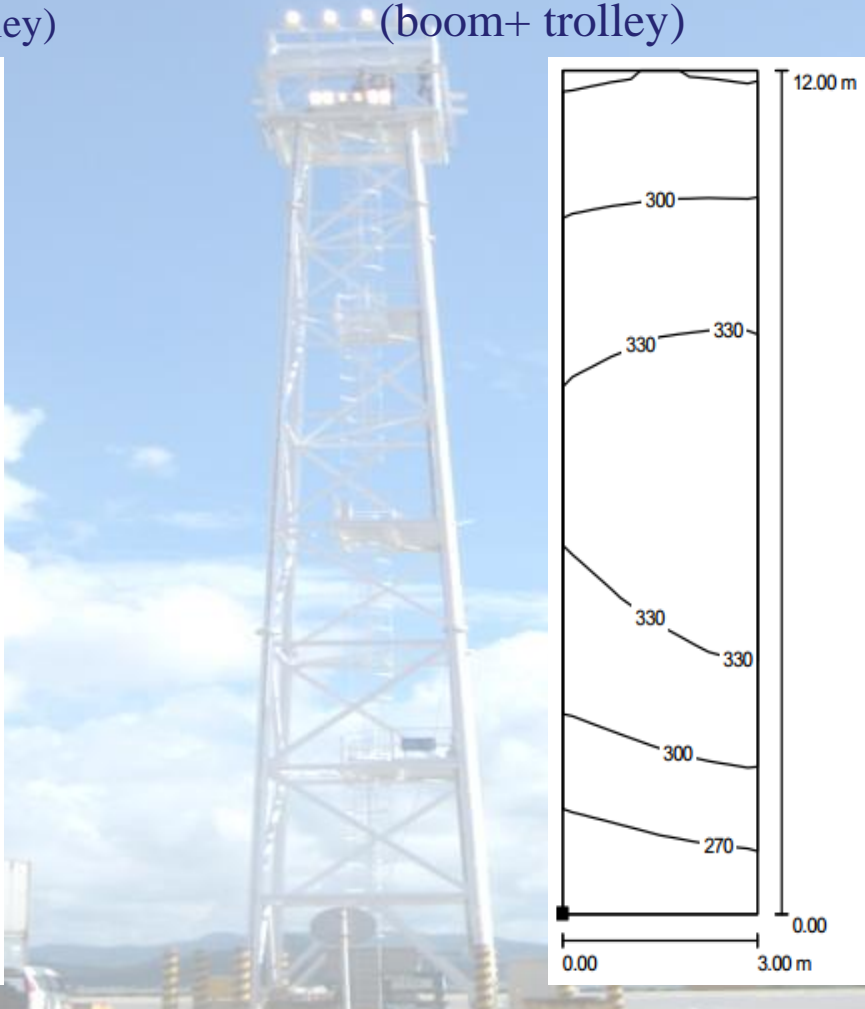
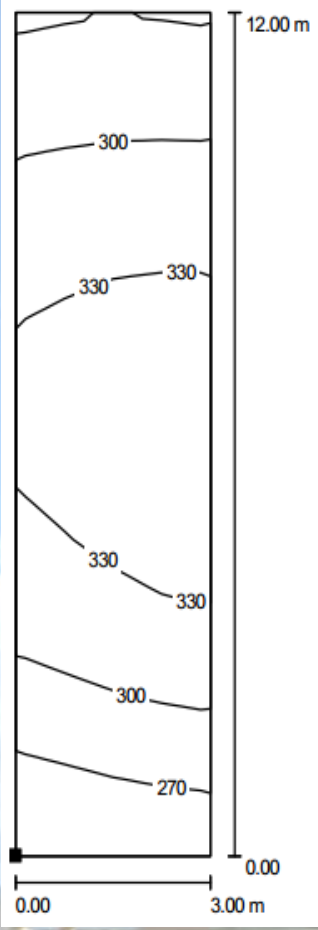
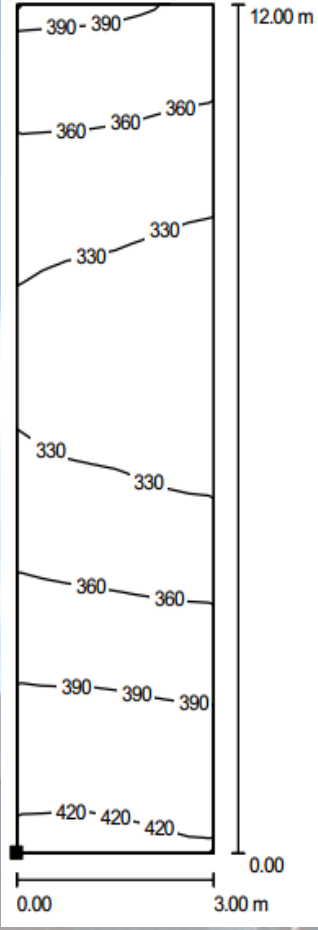
Backreach/A-girder/Boom Height: 55m

Portal Beam Height: 15m

QC/STS Illuminance Distribution Diagram – under trolley 3m*12m

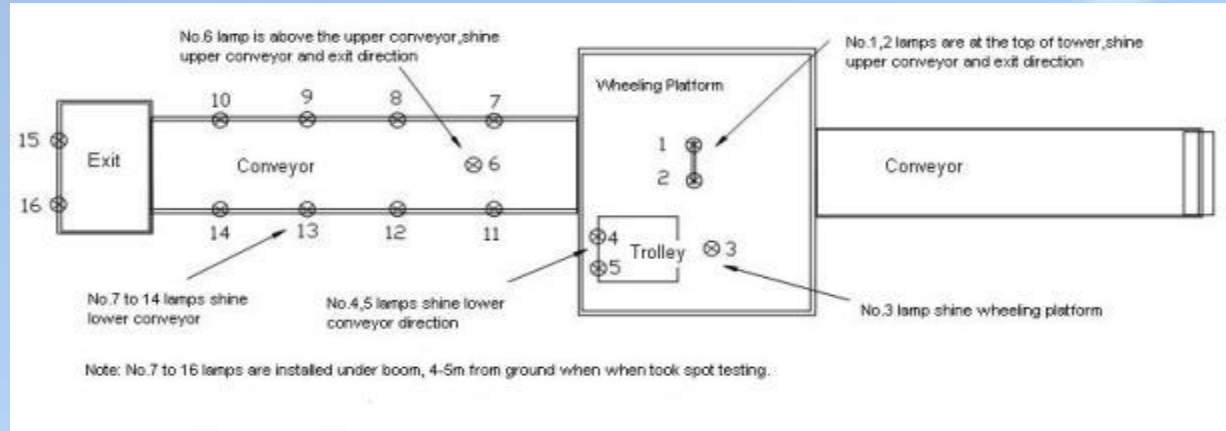
Land Area Illuminance Simulation Diagram
(A-girder + Portal beam+ trolley)

Boom Area Illuminance Simulation Diagram
(boom+ trolley)



E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
359	311	428	0.867	0.726	310	240	349	0.775	0.689

Application Case 3: Bucket Wheel Stacker



★ Light Quantity:

16 pcs CLC-LED Lights (7pcs 110W, 9pcs 60W)
replaced 16pcs HPS Lights (2pcs 1000 (1200)W,
14pcs 400(480)W)

► **Energy Saving Rate = $(9120-1240)/9120=86.4\%$**

After replaced by CLC-LED Lights,

- illuminance under exit is 208 lux, 114% higher than before.
- illuminance in the middle of No.11 and 12 is 151 lux, 19% higher than before.
- Average illuminance of upper/lower conveyor both above 100lux.

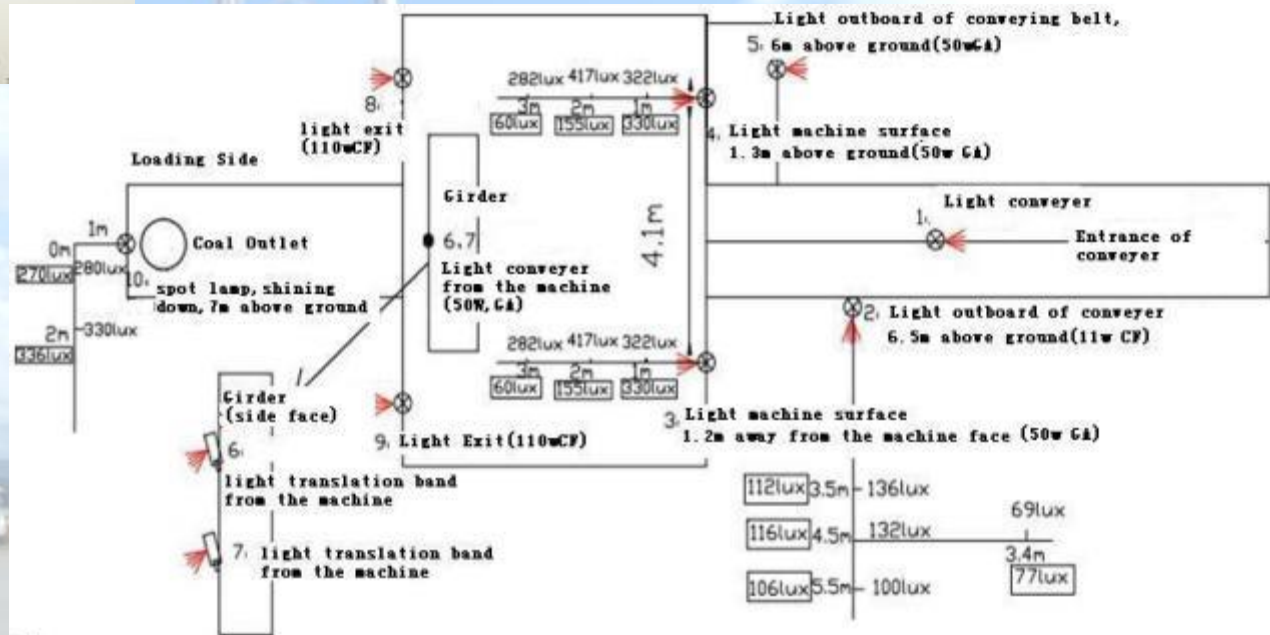
Application Case 4: Barge Ship-loader



★ Light Quantity: 10 pcs CLC-LED Lights replaced 10 pcs 400(480)W HPS Lights

▶ Energy Saving Rate = $(10 \times 480 - 4 \times 110 - 6 \times 60) / (10 \times 480) \times 100\% = 83.3\%$

Ship-loader illuminance Comparison



Note: Illumination in the box is practical illumination, without box is the simulation illumination of CLC-LED lamps.

Application Case 5: Ship Unloader



**Energy Saving
Rate = 79.5%**

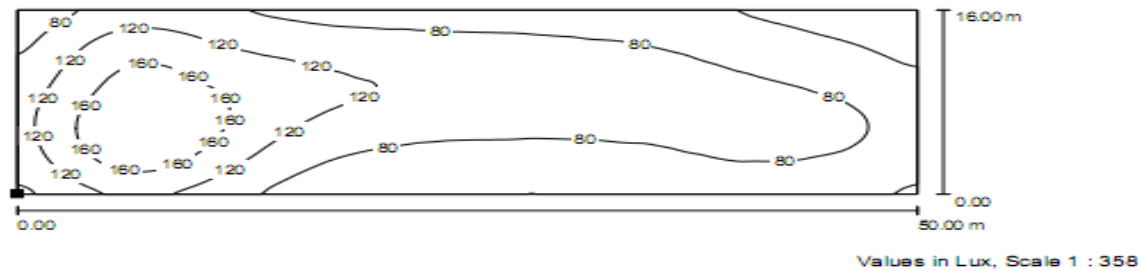
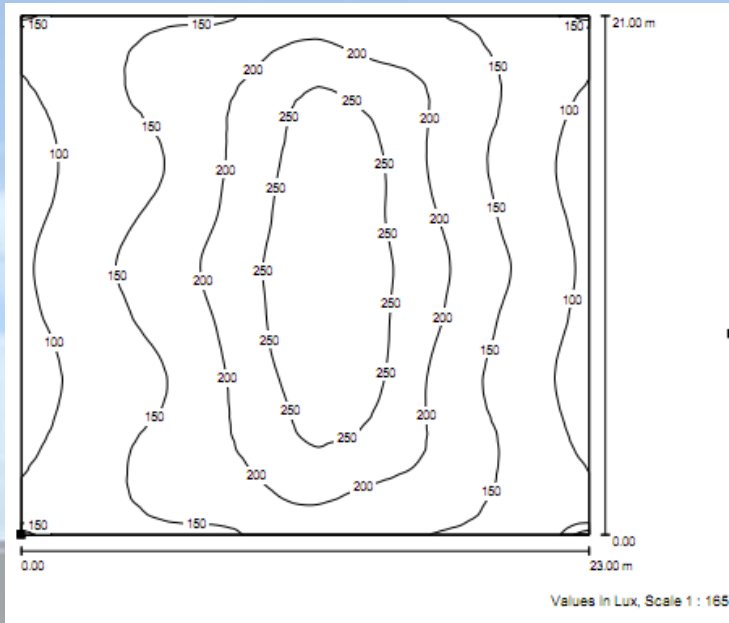
Location	HPS Lamp QTY (PCS)	HPS Lamp (actual) Power (W)	CLC-LED Lamp Power (W)	CLC-LED Lamp QTY (PCS)	Energy Saving (W)	
Machine Room	6	250 (300)	80	6	1320	
Boom (shine deck)	8	1000(1200)	110	16	7840	
	2	250(300)	80	2	440	
Land Area	Girder	4	1000(1200)	110	8	3920
	Feeding Platform	1	250(300)	80	1	220
	Hopper Platform	4	1000(1200)	110	8	3920
	Gantry Mounting	4	400 (480)	110	4	1480
Pylon (between land area & boom)	2	400 (480)	110	2	740	
Trolley (install under trolley, shining the ground)	2	1000(1200)	110	6	1740	
Total	33			53	21620	

Ship Unloader Illuminance Distribution Diagram

Land /Boom Area (with trolley) CLC-LED Lights
 Location Diagram/Isolux Simulation Diagram

(land area: girder + gantry mounting + feeding platform + hopper platform)

Lux requirement: average 50lux at deck work area.



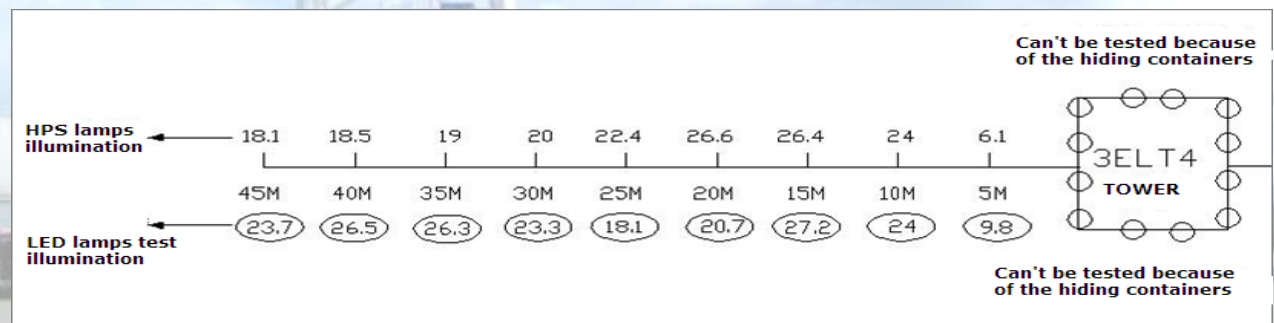
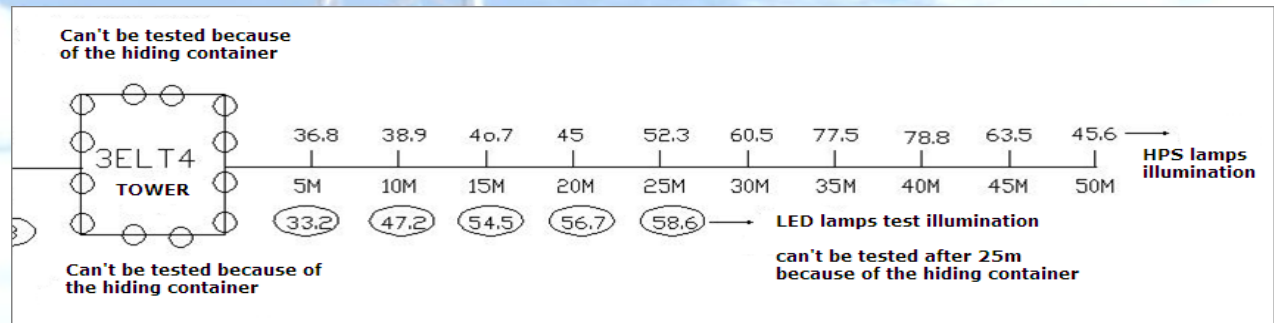
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
96	19	193	0.198	0.099



E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
174	75	281	0.430	0.266

Application Case 6: High Tower

- ★ Tower Height: 35m, measuring radius 50m, color temperature 2700K \pm 300K.
 - ★ 24 pcs 120W G5 CLC-LED Lights and 6 pcs CLC 100W LED Lights (2nd generation) replaced 15pcs 1000(1200)W HPS Lights (replacement ratio 2:1).
 - ★ **Energy Saving Rate = $(18000-3480)/18000=80.67\%$**
 - ★ Compared to HPS Lights, One side avg. illumination increased 17.1%, another side increased 10.24%.
- Uniformity (2 sides): 0.66 / 0.44



Airport

★ High tower Height 30m, measuring radius 50m,
color temperature 2700K \pm 300K

★ 10 pcs 150W CLC-LED Lights replaced 5 pcs 1000 (1200) W HPS lights

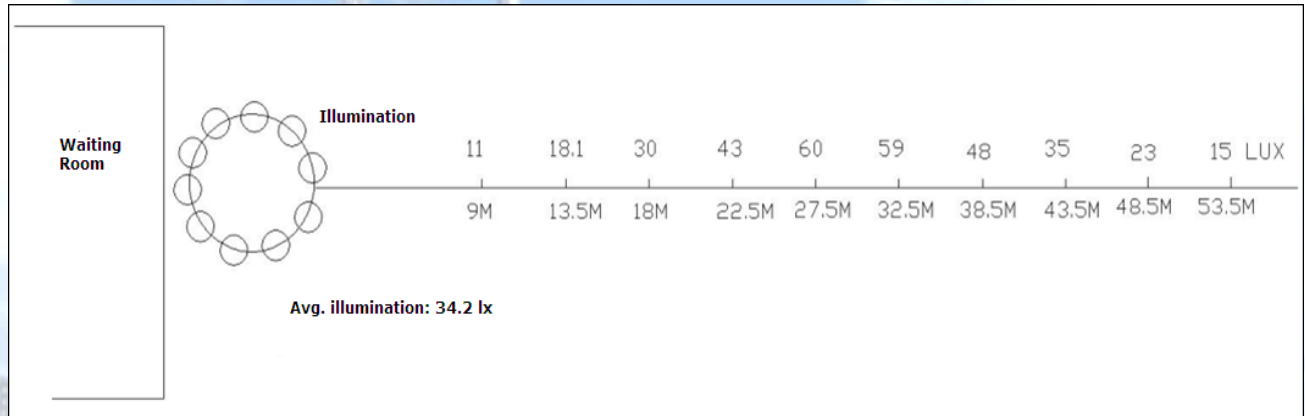
Energy Saving Rate=(6000-1500)/6000=75%

★ Field test result

LED avg. illumination: 34.2lux

LED at 53.5m height illumination: 15lux

Uniformity: 0.32



Application Case 7: Reach Stacker



Location	HPS Lamp QTY	HPS Lamp Actual Power (W)	CLC-LED Lamp Power (W)	CLC-LED Lamp Qty
Arm of Reach Stacker	4	85W (93.5W)	48W	4
Total Lights	4			4

► Total energy saving rate $= (93.5 \times 4 - 48 \times 4) / (93.5 \times 4) \times 100\% = 48.7\%$

Application Case 8: Empty Container Handler



Location	HPS Lamp QTY	HPS Lamp Actual Power (W)	CLC-LED Lamp Power (W)	CLC-LED Lamp Qty
Cabinet Roof	4	85W (93.5W)	48W	4
Lifter	2~4	35W (38.5W)	18W	2~4
Total Lights	6~8			6~8

► Total energy saving rate = 49.4%~50%

Business Model

- ◆ Continuous engagement with harbor port operators to listen to the requirements
- ◆ Supply products directly to:
 - Port operators
 - Installation/engineering contractors
 - Harbor equipment manufacturers
- ◆ Service and Support
 - Support site survey, illumination design, simulation, proof of concept, installation method statements, supervision of installation and adjustments



Is Your
Partner

Thanks!

CLC TECHNOLOGY ENTERPRISE CO., LTD 华勤科技企业有限公司

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