

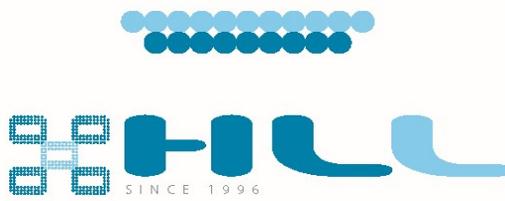
LEAD THE FUTURE

# Hungaro Lux Light Ltd.

Company Presentation

[www.hungarolux.hu](http://www.hungarolux.hu)





Lighting plays a very important role in our life but we are all aware of the fact that, apart from sunlight, operating the lighting fixtures inevitably adds up to the facility management costs. It consists of both the price of the used electrical energy and the maintenance costs. The latter can be split further to materials (lamps, ballasts, parts, etc) and labor costs paid to maintenance crew, and it can take up more financial resources than one may think at first.

In the business life the widespread lamps are mostly fluorescent lamps (even the compact ones can be counted to this group) and high intensity discharge lamps (such as metal halide and sodium). They consume lots of energy, only part of the light emitted by the lamp can be directed to the illuminated surface, resulting in 50-80% of system efficiency. Moreover, the lifespan of these lamps are limited to 3-4 years, meaning that in an average business facility the maintenance crew is virtually always busy changing the lamps. This has another backside, the tenants (or the facility's own workers) has the impression that the lighting is never functioning to the full, while keeping on reporting faults all the time.

With the LED (also called SSL which stands for Solid State Lighting) lighting all this can be changed dramatically. Having been developed at a breakneck pace the modern LEDs are capable of offering long-lasting, stable, cutting-edge lighting solutions. A typical LED fixture has system efficiency at least twice the traditional lamps. The life expectancy varies from 20,000 to 100,000 hours, taking the burden of maintenance off the crew. A thoroughly and carefully designed LED luminaire obtained from a reputable source may maintain its technical data for a long time.

Changing to LED technology with its opportunity of saving both electrical and maintenance costs has a payback period of 1-5 years depending on the annual operation hours, and the local cost of electricity, parts and human workforce. The LEDs, thanks to their electrical parameters, can be easily dimmed, and integrated into intelligent solutions, such as telemanagement, BMSs, smart metering, fault detection and prevention, etc.

Although the LEDs can be considered mature now, caution is advised when it comes to place an order. At first glance building a LED fixture is relatively easy, which led to a baffling abundance of manufacturers, most of them offering low-grade products from the Far East. However cheap and affordable they may seem, one has to bear in mind that developing a LED luminaire which delivers reliably on the long run is far from easy. The manufacturer has to weight and harmonizing all kinds of factors of efficiency, efficacy, thermal management and electrical parameters carefully thus developing really outstanding products.

Hungaro Lux Light Kft is a reputable LED manufacturer company with a long track of realized projects both indoor and outdoor. These include shopping malls, hotels, residential buildings, office buildings, parking lots and garages, and even petrol stations, some of them have been operating since 2010 without mentionable complaints. Our Ukrnafta – leader in Ukraine's oil industry – project (a mock-up filling station was realized back in 2010) has 2 years of payback period, the estimated amount of the whole project is 3 million euros. The German Netto retail store chain uses the PearlLight street lighting family, having made sure through a series of field tests and pilot projects that the fixtures are of excellent quality, and deliver on the long run too, thanks to our philosophy using only those parts, electronics and solutions which proved to be the best during the laboratory and field tests without complaints.



Uniquely in the market, the Hungaro Lux Light Kft offers 5-15 years (or more in case of certain products) warranty not only against abnormal luminous flux degradation but against color temperature deviation too, thus reducing the risk of the buyer to almost zero.

**Hungaro Lux Light Kft**, established 1996, is a privately owned manufacturing and development company based in Hungary. In 2000 we began to focus on LED technology primarily. In 2008 the company as a part of a consortium received a funding from the EU which targeted the development of a street lighting product family. It led to the development of our PearlLight family which proved to be success story in Germany. The company exports into Germany, Slovakia, Poland, Egypt, and has distributor in South Africa and the USA as well. Our product range includes indoor and outdoor solutions, with biggest focus on street lighting products. Based on years of experience we are a dedicated Cree LED chip user, which we think is the market leader in today's LED chip technology. Beyond our day-to-day operations we continuously cooperate with universities and research institutes to keep up with the latest technologies and incorporate them into marketable solutions.



# About Us

- Our Mission is to provide innovative, yet sustainable LED lighting solutions
- 20+ years of experience in LED street lighting providing turnkey solutions from design to implementation
- Flexible production capacity, in-house know-how, reliable manufacturing partners
- 100% manufactured in the EU

*Innovation, Accountability, Flexibility, Readiness*

# Our Figures

- Limited Liability Company
- Established in 1996
- Privately owned
- 11 permanent employees, of which
  - 5 white collar
  - 6 blue collar
- No of production staff can be tripled in 8 weeks, if needed
- Turnover
  - Y2012: 111,890,000 HUF
  - Y2013: 110,903,000 HUF
  - Y2014: 269,000,000 HUF
  - Y2015: 418,377,000 HUF
- Current production capacity: 60,000/year
- Maximum production capacity: 180,000/year



**2017**

## HUNGARO LUX LIGHT Ltd.

11119449-2-42

The **financial risk** of establishing business relationship with the abovementioned business association is **extremely low**.

At the Hungarian market only 0.63 per cent of the companies are entitled to Bisnode “AAA” credit rating which represents excellent financial standing.

Bisnode is one of Europe’s leading providers of digital business information. The qualification system of Bisnode considers hundreds of variables when establishing – on a statistical and professional basis – which companies are the most dependable. The most dependable companies of Hungary with which the conclusion of business carries the lowest risk are selected through the inspection of all business undertakings on the basis of international standards and by applying the country-specific peculiarities as well.

JÓZSEF KELETI, COUNTRY MANAGER  
BISNODE GROUP HUNGARY

Budapest, 22.05.2017



# Products & Services



- Wide range of street lighting products based on existing know-how and patents
- Easily adaptable to current setups, and even to smart city concepts
- 5-15 years of guarantee for each product
- Services span from initial analysis and design to implementation and warranties
- Flexible production capacity
- Innovative mindset for continuous development
- Experience in European procurement and funding systems

# Our Aim in the Greek market

- We are looking for a Greek partner with whom we can aim for tenders and procurement processes in Greece
- We can offer our product range, production capacity and know-how to Greek companies that have the local knowledge on the Greek lighting market and tenders
- We are also interested in providing production capacities or establishing production capacities in Greece

# GENERAL INFORMATION ON LED LIGHTING



# Target of design



- Long lifespan
- Significant energy saving
- Better lighting parameters via modernization
- Competitive price LED vs. sodium lamp, short payback period
- Conformity to relevant lighting standards
  - EN 13201 (Road Lighting)
  - EN 60598 (Luminaires)
  - Other regulation and expectation by operators

# Long lifespan, reliability



PearlLight LED lighting system:

1, Die cast aluminum body

2, Optical system

3, Cree LED

4, Power supply

5, Driver (constant current)

# Long lifespan, reliability



## 1, Die cast aluminum body

Main requirements:

Direct thermal contact

Durable material and coating

Well designed thermal conductivity



# Long lifespan, reliability



## 2, Optical system

Main requirements:

Proper light distribution

UV resistance of plastic parts

Durable

High transparency (high lumen output)



# Long lifespan, reliability



## 3, Cree LED

Main requirements:

Thoroughly tested lifespan

Reliable supplier (World No.1 - in every aspect)

High quality (durable)

High efficiency lm/W



# Long lifespan, reliability



## 4, Power supply

Main requirements:

Proper electrical parameters (e.g. highest possible  $\cos \phi$ )

Reliable supplier



# Long lifespan, reliability

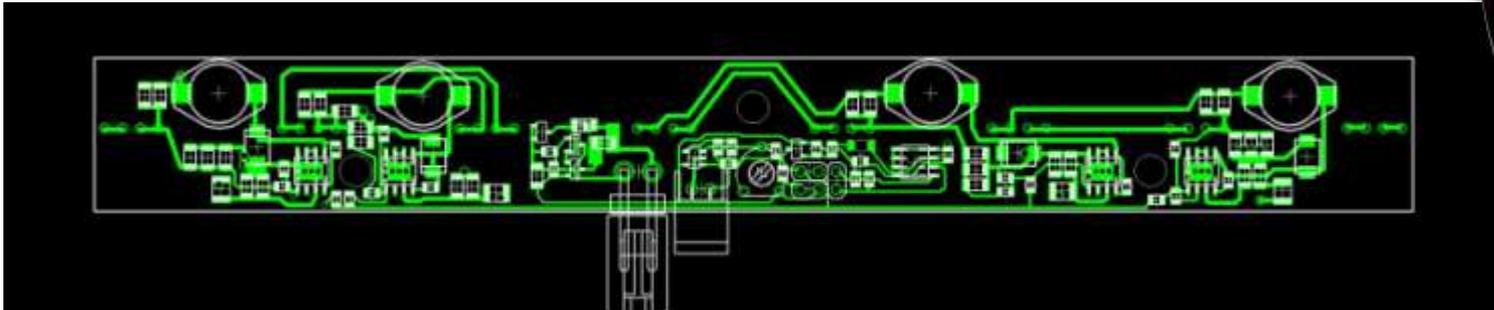


## 5, Driver (constant current)

Main requirements:

Proper electrical parameters

Durable parts



# Long lifespan, reliability



Exact requirements:

A - 60.000 hours useful operation time

B - Low lumen degradation (High maintenance factor)

C - Low maintenance cost

D - Meet standards

# 80.000 hours operation time

- The weaknesses of parts:

- a. LED chip

  - L-70: operating time to 30% lumen decrease

  - LM-80: 6000 hours test

  - Operating conditions

  - Thermal management

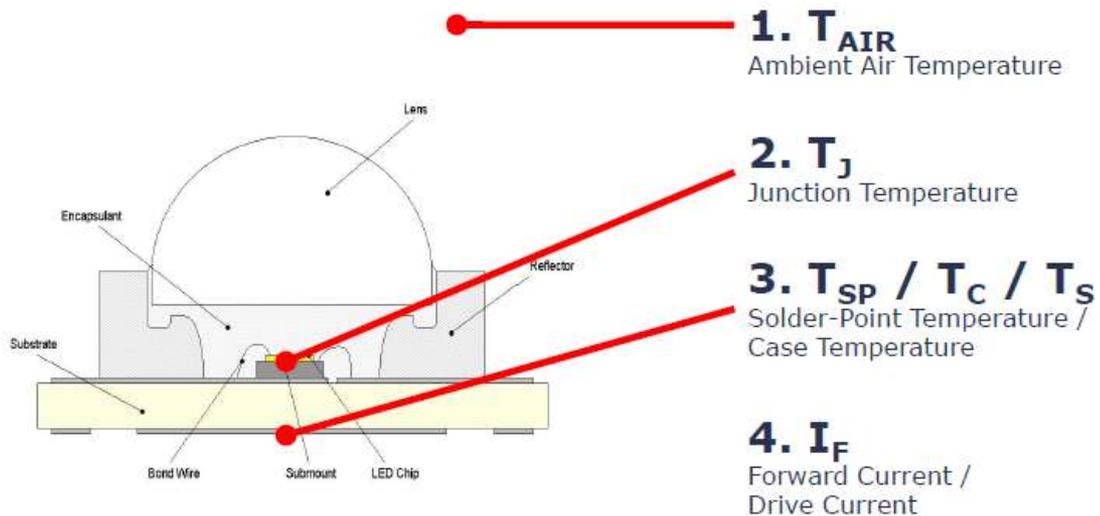
- b. Electrolyte capacitor in power supply

  - Estimated life time



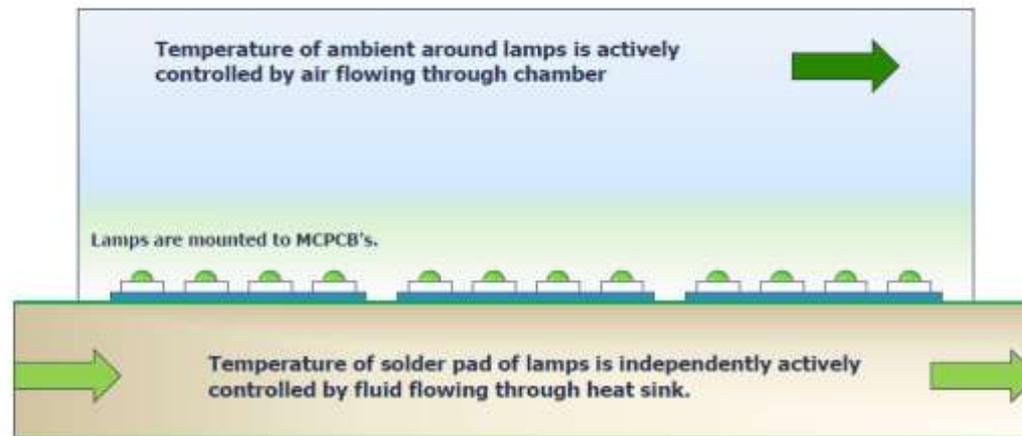
# 80.000 hours operation time

## LED Lumen Maintenance Critical Parameters



# 80.000 hours operation time

## LED Testing Per LM-80 Methods

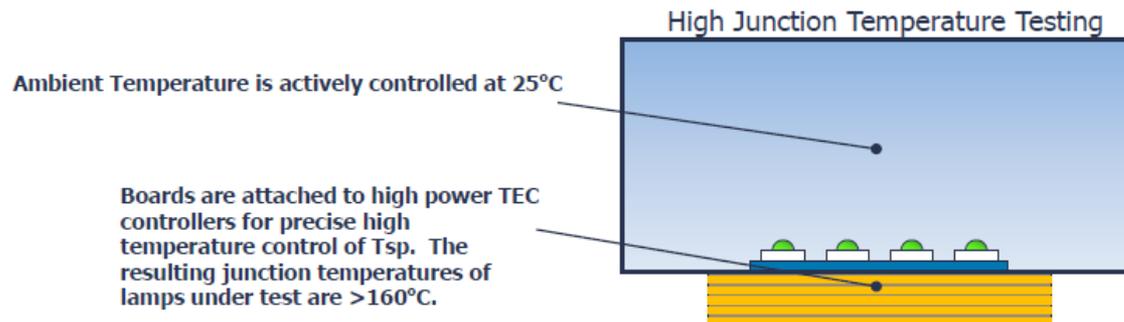
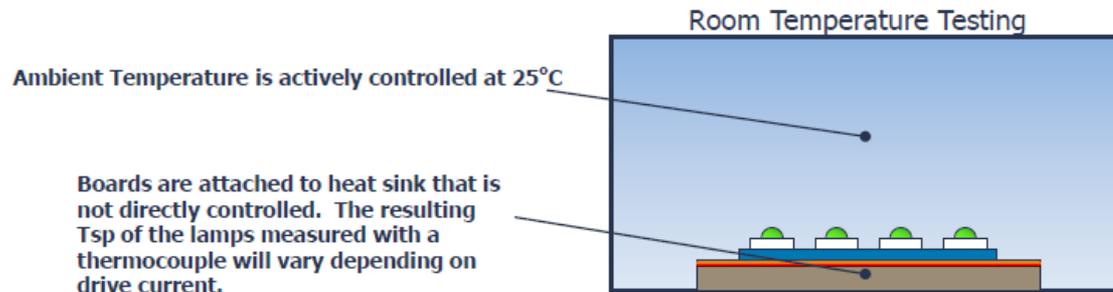


### LM-80 Highlights:

- 6000 hours (250 days) minimum testing
- $T_{air} = T_c$
- No seasoning period (e.g., 24 hours, 1000 hours)
- Exclude catastrophic failures from data set (but include basic FA)

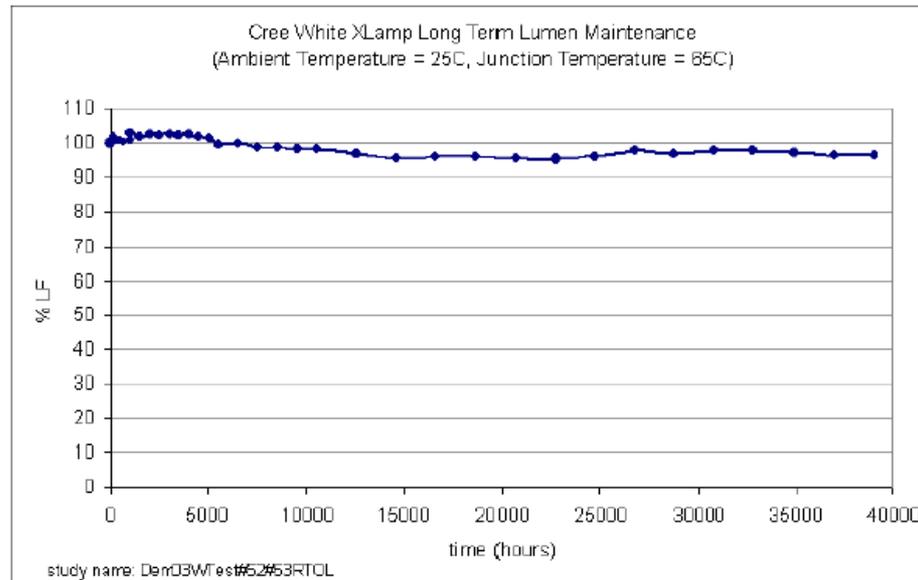
# 80.000 hours operation time

## Other Long-Term Test Configurations



# 80.000 hours operation time

## 40,000 Hour / 4.5 Year XLamp Long-Term Data

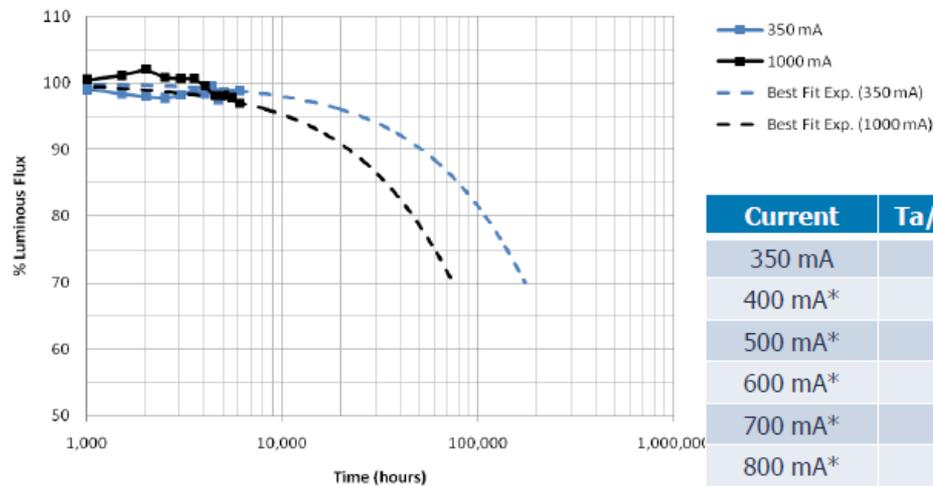


- At lower ambient air temperature, LEDs hardly depreciate at all.



# 80.000 hours operation time

## XLamp XP-G White L70 Lifetime (Ta=85°C)



Current	Ta/Tsp (°C)	L70 (hours)
350 mA	85	174,071
400 mA*	85	163,116
500 mA*	85	143,231
600 mA*	85	125,771
700 mA*	85	110,439
800 mA*	85	96,976
900 mA*	85	85,154
1000 mA	85	74,773

\* Interpolated values

### Notes:

- These extrapolations are for informational purposes only and are not a warranty or a specification.
- Extrapolated lifetimes are subject to change without notice.
- Extrapolations use the best-fit exponential method (fit to all data points).
- Notice: Cree will revise L70 lifetimes to those calculated by IES TM-21 methods once TM-21 is finalized.



# 80.000 hours operation time

LM-80 Test summary, Cree XPG LED: source [http://www.cree.com/products/pdf/LM-80\\_Results.pdf](http://www.cree.com/products/pdf/LM-80_Results.pdf)



Data Set	Case Temp. [T <sub>s</sub> ]	Ambient Temp. [T <sub>A</sub> ]	Drive Current [I <sub>F</sub> ]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	1000 mA	98.7%	0.0032
2	55°C	55°C	350 mA	99.1%	0.0020
3	55°C	55°C	1000 mA	98.6%	0.0009
4	85°C	85°C	350 mA	98.7%	0.0009
5	85°C	85°C	1000 mA	98.7%	0.0015

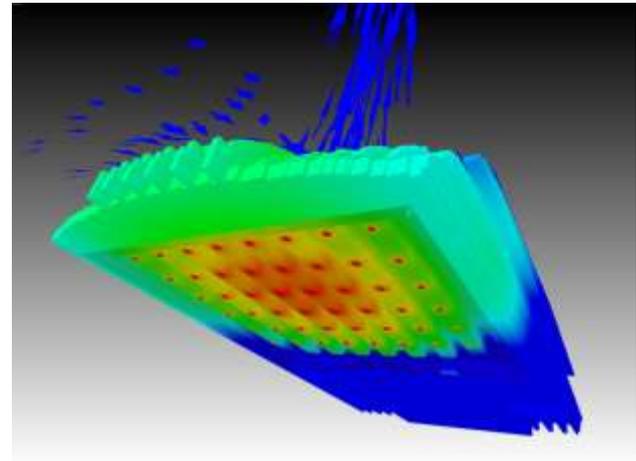
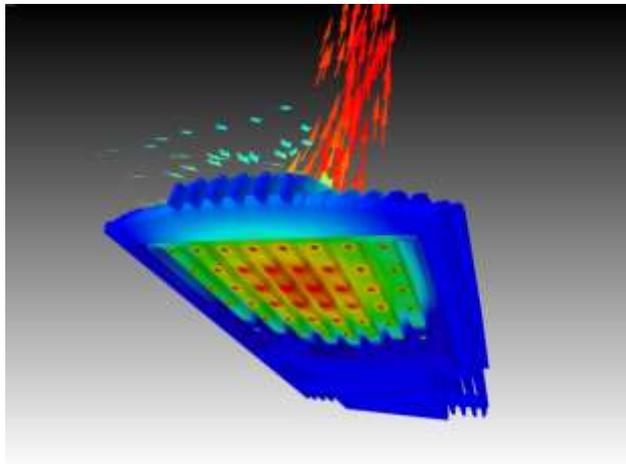


# 80.000 hours operation time

- Thermal management:  
controlled by Menthor Graphics

Worst case: ambient temperature 35°C and 1000 mA;  $T_j=90^\circ\text{C}$  ( $T_{j\text{LED}}$  maximum: 130°C)

In reality: average ambient temperature at night 10°C and maximum 700 mA;  $T_j=65^\circ\text{C}$



# 80.000 hours operation time

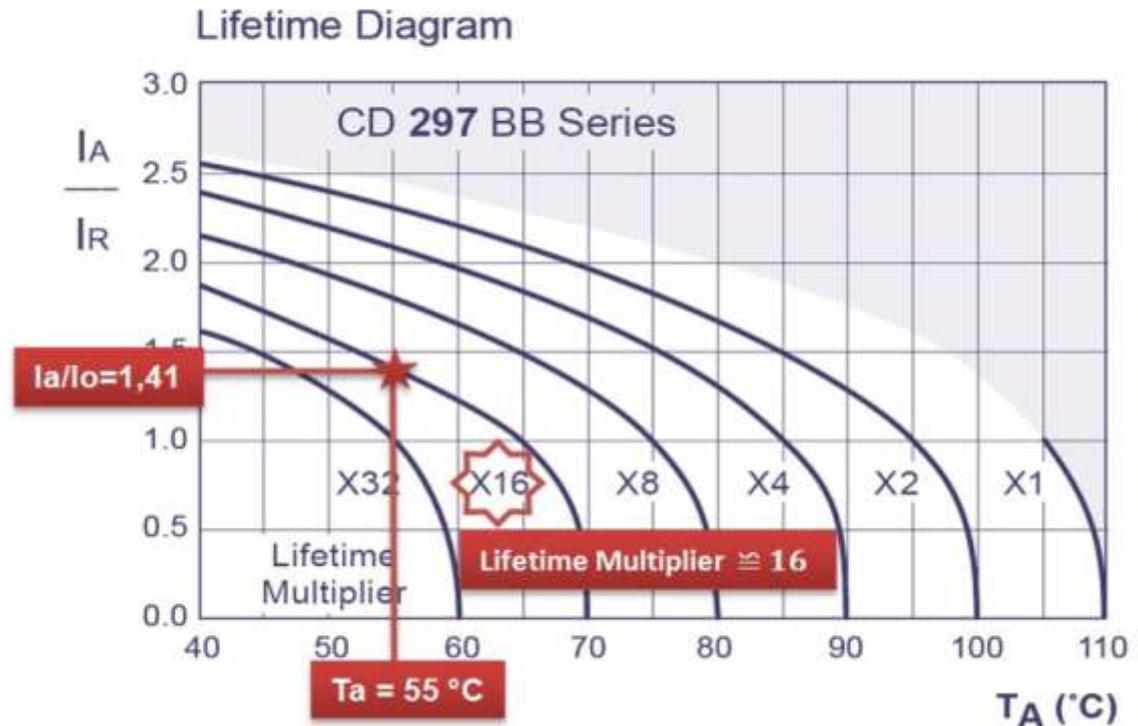
Capacitor operating time is 7000 hours, at 105°C.

As the operating temperature decrease the life time increases.

At 65-70°C the average operating time is about 95.000 hours.

Notice: the most important point is the thermal management.

$$L_x = L_0 \cdot 16 = 7,000 h \cdot 16 = 112,000 h \cong 13 \text{ years}$$



$I_A$  = actual ripple current at 120Hz,  $I_R$  = rated ripple current at 120Hz, 105°C  
Multiplier of Useful Life as a function of ambient temperature and ripple current load



# Maintenance factor



□ Maintenance factor = LLMF x LSF X LMF

- LLMF: Lamp lumen maintenance factor
- LSF: Lamp survival factor
- LMF: Luminaire maintenance factor

□ In case of PearlLight street lamps:

LLMF = lumen degradation ratio until 60.000 hours (Main points: LED parameter and Thermal management)

**LLMF XP- G LED: 0.97 (T<sub>sp</sub>=65°C) X optics degradation 0.92 = 0.89**

LSF (early failures of the lamp): based on high quality standards and control during the manufacturing the failure ratio 3%.

Therefore the **LSF = 0.97**

**LMF (based on CIE 154:2003, 4 years cleaning interval) = 0,89**

# Maintenance factor



□ **Maintenance factor = LLMF x LSF X LMF**

$$MF (xpg) = 0.89 \times 0.97 \times 0.89 = 0,77 @ 60.000 \text{ h}$$

$$MF (xpe) = 0.78 \times 0.97 \times 0.89 = 0,67 @ 60.000 \text{ h}$$

□ MF (xpg) = 0,80 @ 50.000 h

$$MF (xpe) = 0,71 @ 50.000 \text{ h}$$

□ MF (xpg) = 0,82 @ 40.000 h

$$MF (xpe) = 0,74 @ 40.000 \text{ h}$$

See the difference in lifespan:

Conventional sodium lamp MF = 0,8 @ 8000 h

# Lumen calculator



Compare:		LED lm	LED lm/W	SYS lm tot	SYS W	Current Display Range				Medium (0.1A - 2.0A)			
System:		Target Lumens : 1				Optical Efficiency: 85%				Electrical Efficiency: 85%			
Current (A)	LED 1				LED 2				LED 3				
	Model	Flux	Price	LED Multiple	Model	Flux	Price	LED Multiple	Model	Flux	Price	LED Multiple	
	LED lm	LED lm/W	SYS lm tot	SYS W	LED lm	LED lm/W	SYS lm tot	SYS W	LED lm	LED lm/W	SYS lm tot	SYS W	
0,100	632	119,9	537	6,2	601	116,5	511	6,07	677	139,6	575	5,71	
0,150	913	113,7	776	9,45	869	110,7	739	9,24	1011	136,8	859	8,69	
0,200	1184	109,1	1006	12,76	1126	106	957	12,49	1337	133,7	1136	11,76	
0,250	1444	105,2	1227	16,15	1373	102,2	1167	15,81	1656	130,5	1408	14,93	
0,300	1693	101,6	1439	19,61	1609	98,6	1368	19,2	1966	127,3	1671	18,16	
0,350	1931	98,3	1641	23,12	1835	95,3	1560	22,65	2268	124,3	1928	21,46	
0,400	2159	95,2	1835	26,68	2051	92,3	1743	26,14	2562	121,4	2178	24,84	
0,450	2376	92,3	2020	30,29	2257	89,5	1918	29,68	2848	118,5	2421	28,27	
0,500	2582	89,5	2195	33,93	2452	86,7	2084	33,26	3127	115,8	2658	31,76	
0,550	2778	86,9	2361	37,6	2637	84,2	2241	36,85	3396	113,1	2887	35,32	
0,600	2964	84,5	2519	41,28	2813	81,8	2391	40,47	3659	110,6	3110	38,92	
0,650	3138	82,1	2667	44,98	2978	79,5	2531	44,09	3913	108,2	3326	42,55	
0,700	3304	79,9	2808	48,67	3135	77,3	2665	47,73	4160	105,8	3536	46,25	

PearlLight 18-22 G



# Maintenance costs

- 4 years cleaning interval  
(the same as sodium)
- No regular bulb replacement  
(2,5 years replacement interval at sodium)
- 5 year warranty

# Street lighting modernization with energy saving

Pilot project in city of Marcali:

Before:

street lighting - Schreder (Z2) 10 years old, 100W sodium lamp, energy consumption 117W



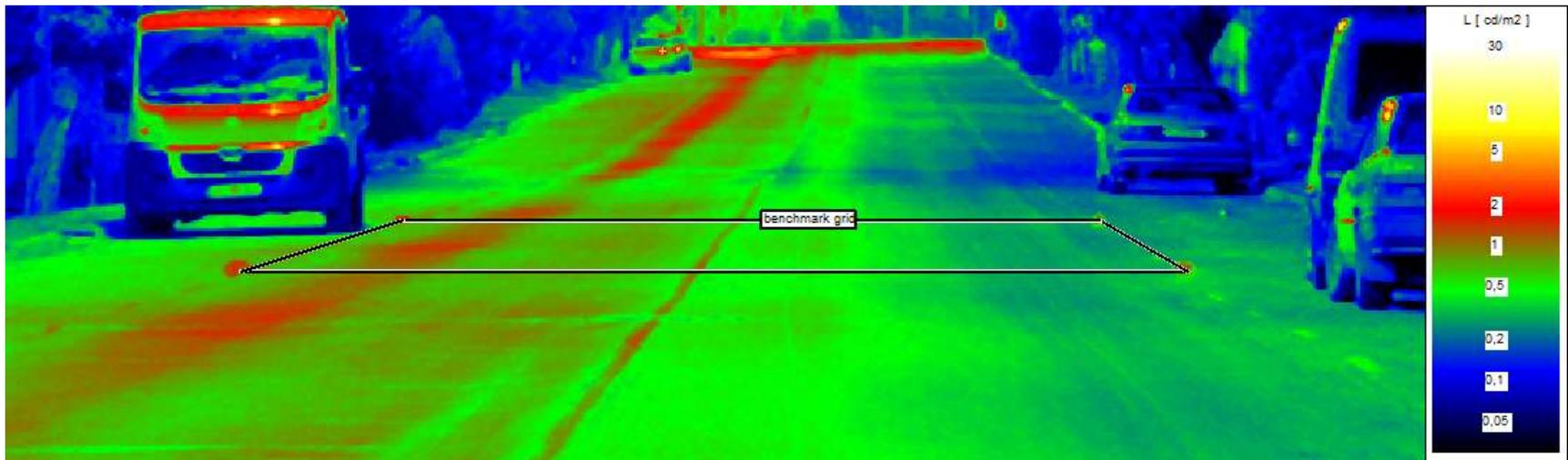
# Street lighting modernization with energy saving

- After:
  - street lighting: PearlLight 48-60E, energy consumption 60W



# Street lighting modernization with energy saving

## □ Test results:



- $E = 0,598 \text{ cd/m}^2$   
 $U_0 = 0,49$
- $U_1 = 0,9$
- Fit to ME5 road class, energy saving 48%

# Competitive price: LED vs. Sodium lamp

Modernisation to LED results in

- significantly **lower TCO** (Total Cost of Ownership), therefore
- **short payback period**



# Competitive price: LED vs. Sodium lamp



TCO consists of:

- Energy cost (LED: up to 70% savings)
- Maintenance costs
  - Planned maintenance
    - Cleaning intervals (the same)
    - Lamp replacement (by LED: zero)
  - Ad hoc maintenance
    - Lamp failure (no lamp, only LED-chips, general failures are very unlikely, LED-strips are replaceable)
    - Luminaire failure (luminaire can report before failure; strong enclosure and tiny optics is not subject to vandalism)

# Why to choose the PearlLight product family?

## Outstanding professional experience

- The developer of the *PearlLight product family*, the *Hungaro Lux Light Kft*, has been on the market of general and decorative lighting products **for 17 years**

## Several years of development based on research

- The basis of the development of *PearlLight product family* is the **continuous research and development**.
- The manufacturer and the researchers of the **Hungarian Academy of Sciences, Technical University of Budapest** and the **University of Veszprém** started a joint research with funding of more than 3 million euro.
- The **continuous research and development covers four main areas** in which the PearlLight product *family* exceeds or meets the expectations of environmental protection and energy saving
  - streetlighting, Smart City conception
  - office and industrial applications,
  - substitution of fluorescent tubes,
  - substitution of general-purpose household lamps/fittings.



## Business principles, development goals

- **Energy-saving** – less consumption with up to 50-80%.
- **Long lifespan**
- **High reliability** – providing consistently the favourable technical parameters guaranteed by the developers allows for utilization of components from only pre-qualified suppliers.
- Exceptionally long **warranty of 5 years**, which can be **extended by extra 10 years!**



## Proven professional expertise

- **References** in all over Europe in the course of the recent years.
- **Proven results:** the payback results of the projects realised in the recent years have justified the calculations showing the change from traditional lamps to LED-lamps pays off in short time.
- **Short payback period:** in the case of lamps that operate 12-24 a day, the investment pays off in 1-3 years.
- **High energy saving:** the energy consumption drops off with 50-80% when changing to LED-lighting, depending on the technical features of the actual lighting.

## Major clients, projects, financial data

Client	Project	Payback period
Accor Group, France	Hotel Sofitel Chainbridge, Budapest – indoor and outdoor lighting	20 month
MOM Park MFC, Budapest	MOM Park Shopping Mall, Budapest – indoor and outdoor lighting	20 month
Raiffeisen Bank, Austria	Raiffeisen branch, Budapest – indoor and outdoor lighting	1 yrs
Gordiusz Zrt	Alle Center Shopping Mall, Budapest – indoor and outdoor lighting	2 yrs
State Motorway Company, Hungary	Engineering site – outdoor lighting	3 yrs
MOL	80 petrol station, indoor and outdoor lighting	3 yrs
Hajdúböszörmény, Hungary	Street Lighting with Smart City conception	4 yr



## Benefits compared to the cheaper products from the Far East

- According to the experience of our clients, developers and different stakeholders, the technical data given on the data sheets of cheaper – mainly far-eastern – manufacturers are **not always reliable**
  - The real consumption is **higher than the promised wattage** hence the energy saving is lower
  - The **ageing is faster than promised** therefore the shorter lifespan reduces the payback period
  - The color temperature of the delivered products **often differs from the promised color temperature**
  - The **deviation of the color temperature** of the LED products within one delivery is too high
- Although the price level of the most far-eastern manufacturers/distributors is lower compared to the *PearlLight family*, deciding in favour of these cheaper products rarely pays off. Many of our clients - before buying *PearlLight* - have **gained unpleasant experience with the quality of inferior products regarding the technical and financial aspects**. The conclusion has been drawn that these products may be cheap to buy but expensive to maintain.
- The **warranty of 5 years** for *PearlLight products* is rare on the market of the lighting products.

## Benefits compared to the products of established, renowned competitors

- According to our experience often the LED -products of **even the renowned, more established brands may fail to deliver**, owing to the differences between the data sheet values and the reality:
  - the energy saving targets are not met, due to higher-than-promised energy consumption,
  - the ageing is faster than promised, which results in longer payback period,
  - the color temperature differs from the ordered value,
  - the values of color temperature vary within one delivery.
- The price **level of the *PearlLight products* are more favourable compared to the products of the renowned manufacturers**. Oftentimes even the list prices of the *PearlLight* are more beneficial than the heavily reduced project prices of the major brands.
- The **warranty of 5-15 years** for *PearlLight products* is rare on the market of the lighting products.



## PearlLight street lighting

Even **50-65%** energy saving  
 Pleasant color temperature  
 High CRI  
 Illumination compliant to European standards  
 HungaroLux Light™ thermal management  
 Simple installation  
 Minimal maintenance need  
 5 years warranty  
 ME2-ME6

All types of our luminaires comply with  
 European street-lighting standards  
 in all kinds of road categories - compliance  
 certificate available on request.

### Application

Main and local roads (ME2-ME6), industrial facilities,  
 parking lots



220 V  
240 V



IP66



max  
+50°C

min  
-40°C

IEC  
EN60598



IK 08



Made  
in the EU

Az adatok előzetes értesítés nélkül változhatnak / Technical data are subject to change without prior notice  
 Minden jog fenntartva / All rights reserved  
 Utolsó módosítás / Last modified: 2013. 01. 12.

## PearlLight street lighting

### Lighting

<b>Colour Rendering Index</b>	>85
<b>Correlated</b>	2800K, 4200K or
<b>Colour Temperature</b>	as requested
<b>Light efficacy</b>	156 lm/W (for LED)
<b>Number of LEDs</b>	From 18 to 48
<b>ULOR</b>	0%
<b>LOR</b>	87%

**Lumen maintenance (L80)** Over 80,000 hrs (20 year @ 4000hrs/yrs)

**Optic** HungaroLux Light optical system, UV-stabilized polycarbonate (1k8) microbowls, for all road categories ME2-ME6

**Light source** Cree XP-G



### Electrical

<b>Controls system input</b>	One-way or interactive communication (1-10V, DALI, PWM, UART, PLC or as requested) for easy management
<b>grid</b>	
<b>Dimming</b>	1-100%
<b>Dimming Options</b>	Light control with interactive communication and/or motion detector
<b>Power Supply Unit</b>	Mean Well, with PFC unit and fuse, protected against voltage fluctuations

<b>Interactive Comm Options</b>	PowerLine, GSM or other radio or wire-based protocols
<b>Overvoltage Protection</b>	Separate double protection for driver and LED modules 0,942
<b>Power Factor</b>	Class I
<b>Protection Class (IEC)</b>	Double (active and passive) protection against overheating
<b>Thermal Protection</b>	230 V (AC)
<b>Voltage</b>	



Dimming and controlling options (not included, order separately)

## PearLight street lighting



### Installation

<b>Adjustable tilt angle</b>	Fully adjustable 0°-20° pole-top, or mast-arm, self-locking	<b>Mounting on flammable surface</b>	OK
<b>Mounting</b>	Mast-arm mounting (d=42-60mm) Pole-top mounting (adapter to be ordered separately)	<b>Op. ambient temp.</b>	Between -40 and 50 °C
		<b>Protection against impacts</b>	IK08
		<b>Recommended mounting height</b>	From 6m to 12m
		<b>Standard tilt angle post top</b>	5/15° or as requested

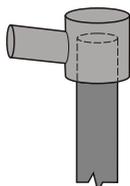
### Maintenance

<b>Warranty</b>	5 years Spare part supply for 15 years
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### Material

<b>Finishing Options</b>	Available also as anodized aluminium cast.
<b>IP Protection</b>	IP66
<b>Material</b>	Cast aluminium alloy

#### Mounting options



*pole-top adapter*

#### (not included, order separately)



*adapter ø42*



*adapter ø48*

## PearlLight street lighting

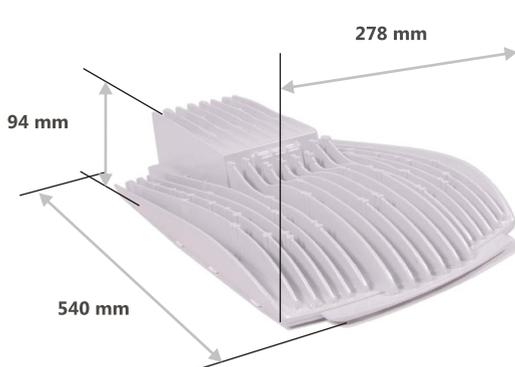
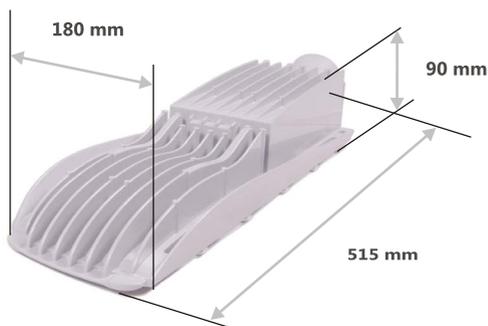
### Dimensions

**PL18** 5,59kg

**PL24** 5,75kg

**PL36** 7,59kg

**PL48** 7,75kg



**All RAL colours are available, some example:**



**5010**



**6011**



**3031**



**9004**



## PearlLight street lighting

Luminaire Type	Correlated Colour Temperature	Luminous flux (lm)	Equivalent FL/HID lamp	Number of LEDs	Road Classification
HIL-PG 18 22W/842 DRV C035	4200 K	3210	CFL 36/45	18	ME6, ME5
HIL-PG 18 35W/842 DRV C050	4200 K	4760	HPS 70/80	18	ME5, ME4
HIL-PG 18 45W/842 DRV C070	4200 K	5620	HPS 70/80	18	ME4, ME3
HIL-PG 24 30W/842 DRV C035	4200 K	4350	HPS 70/80	24	ME5
HIL-PG 24 45W/842 DRV C050	4200 K	6120	HPS 70/80	24	ME4
HIL-PG 24 60W/842 DRV C070	4200 K	7500	HPS 100/115	24	ME5, ME4
HIL-PG 36 45W/842 DRV C035	4200 K	6530	HPS 70/80	36	ME4
HIL-PG 36 60W/842 DRV C050	4200 K	8300	HPS 100/115	36	ME5
HIL-PG 36 92W/842 DRV C070	4200 K	11200	HPS 150/180	36	ME4, ME3
HIL-PG 48 60W/842 DRV C035	4200 K	8700	HPS 100/115	48	ME5
HIL-PG 48 85W/842 DRV C050	4200 K	11600	HPS 150/180	48	ME4, ME3
HIL-PG 48 120W/842 DRV C070	4200 K	15000	HPS 250/285	48	ME3, ME2

Last modified:  
January 2015

series

# PearlLight 18G



## SMALL, BUT POWERFUL

The smallest member of our lamp family, PearlLight 18G, is bigger in lighting, than you think. The shape of the lamp can be an ornament of any modern city: its lighting is colorful and eye-catching.

### PLL 18-22

**CONSTANT LUMINOUS FLUX:**  
2850 lm

**ROAD CATEGORY:**  
Me6

**PRIMARY POWER CONSUMPTION:**  
22 W

**LIGHT SOURCE:**  
Cree XP-G3 LED

**DRIVER:**  
Osram OT  
Mainwell LCM



### PLL 18-45

**CONSTANT LUMINOUS FLUX:**  
5200 lm

**ROAD CATEGORY:**  
Me6

**PRIMARY POWER CONSUMPTION:**  
45 W

### PLL 18-35

**CONSTANT LUMINOUS FLUX:**  
4530 lm

**ROAD CATEGORY:**  
Me6

**PRIMARY POWER CONSUMPTION:**  
35 W

**SIZE OF LAMP:**  
Overall length: 515 mm;  
Width: 180 mm;  
Height: 90 mm  
Weight: 5,59 kg

230 V  
50 Hz



IEC  
EN60598

IP66  
Class I.



max  
+35°C  
min  
-30°C

IK 08

ISO  
9001:2008

ISO  
14001:2004

OHSAS  
18001:2001



series

# PearlLight 24G



## THE PERFECT TEAM MEMBER

The PearlLight 24G is one of our most used lamps. Because of its diversity, it is one of the most universal representatives of lighting.

### PLL 24-30

**CONSTANT LUMINOUS FLUX:**  
3900 lm

**ROAD CATEGORY:**  
Me6-Me4

**PRIMARY POWER CONSUMPTION:**  
30 W

**LIGHT SOURCE:**  
Cree XP-G3 LED

**DRIVER:**  
Osram DA  
Mainwell



### PLL 24-60

**CONSTANT LUMINOUS FLUX:**  
7100 lm

**ROAD CATEGORY:**  
Me5-Me3

**PRIMARY POWER CONSUMPTION:**  
60 W

### PLL 24-45

**CONSTANT LUMINOUS FLUX:**  
5720 lm

**ROAD CATEGORY:**  
Me6-Me4

**PRIMARY POWER CONSUMPTION:**  
45 W

**SIZE OF LAMP:**  
Overall length: 515 mm;  
Width: 180 mm;  
Height: 90 mm  
Weight: 5,59 kg



series

# PearlLight 36G



## WE RAISE THE LIGHT OF THE NIGHT

Where stronger, but still aesthetic lighting is needed, there is the place of the PearlLight 36G. Its dimensions allow it to be placed on any universal lamp post while enhancing its performance and color reproduction by its competitors.

### PLL 36-45

**CONSTANT LUMINOUS FLUX:**  
5850 lm

**ROAD CATEGORY:**  
Me6-Me5

**PRIMARY POWER CONSUMPTION:**  
45 W

**LIGHT SOURCE:**  
Cree XP-G3 LED

**DRIVER:**  
Osram DA  
Mainwell



### PLL 36-92

**CONSTANT LUMINOUS FLUX:**  
10500 lm

**ROAD CATEGORY:**  
Me4-Me2

**PRIMARY POWER CONSUMPTION:**  
92 W

### PLL 36-60

**CONSTANT LUMINOUS FLUX:**  
7800 lm

**ROAD CATEGORY:**  
Me5-Me3

**PRIMARY POWER CONSUMPTION:**  
60 W

**SIZE OF LAMP:**  
Overall length: 540 mm;  
Width: 277,5 mm;  
Height: 93,5 mm  
Weight: 7,75 kg



series

# PearlLight 48G



## NOTHING MORE

There is no need for more light: the PearlLight 48G system spans any kind of space in a friendly and safe light. The lamp that does not know the darkness.

### PLL 48-60

**CONSTANT LUMINOUS FLUX:**  
7980 lm

**ROAD CATEGORY:**  
Me5-Me3

**PRIMARY POWER CONSUMPTION:**  
60 W

**LIGHT SOURCE:**  
Cree XP-G3 LED

**DRIVER:**  
Osram DA  
Mainwell



### PLL 48-120

**CONSTANT LUMINOUS FLUX:**  
13500 lm

**ROAD CATEGORY:**  
Me3-Me1

**PRIMARY POWER CONSUMPTION:**  
120 W

### PLL 48-85

**CONSTANT LUMINOUS FLUX:**  
10200 lm

**ROAD CATEGORY:**  
Me4-Me2

**PRIMARY POWER CONSUMPTION:**  
85 W

**SIZE OF LAMP:**  
Overall length: 540 mm;  
Width: 277,5 mm;  
Height: 93,5 mm  
Weight: 7,75 kg



## Lighting

**CRI**

<85

**Correlated**

2800K, 4200K or as requested

**Light efficacy**

156 lm/W (for LED)

**Number of Leds**

from 18 to 48

**ULOR**

0%

**LOR**

87%

**Lumen maintenance (L80)**

Over 80,000 hrs (20 year)

**Optic**

HungaroLux Light optical system, UV-stabilized polycarbonate (lk8) microbowls for all road categories ME2-ME6

**Light source**

Cree XP-G

**Adjustable tilt angle**

Fully adjustable 0°-20° pole top, or mast arm, self locking

**Mounting**

Mast arm mounting (d=42-60mm)

Pole top mounting (adapter to be ordered separately)

**Mounting on flammable surface**

OK

**Op. ambient temp.**

Between -40 and 50 °C

**Protection against impacts**

IK08

**Recommended mounting height**

From 6m to 12m

**Standard tilt angle post top**

5/15° or as requested

## Installation



## Maintenance and material

**Controls system input**

One-way or interactive communication (1-10V, DALI, PWM, UART, PLC or as requested) for easy management

**Dimming**

1-100%

**Dimming options**

Light control with interactive communication and/ or motion detector

**Power supply Unit**

Mean Well, with PFC unit and fuse, protected against voltage fluctuations

**Interactive Comm Options**

Powerline, GSM or other radio or wire-based protocols

**Overvoltage Protection**

Separate double protection for driver and LED modules

**Power Factor**

0,942

Thermal Protection

Double (active and passive) protection against overheating

**Voltage**

230 V(AC)

## Electrical

**Warranty**

5 years

Spare part suppl for 15 years

**Finishing Options**

Available also as anodized aluminium cast

**IP Protection**

IP 66

**Material**

Cast aluminium alloy

Projects we are proud of

## LED LIGHTING CASE STUDIES

### *INDOOR & OUTDOOR*

*2009 - 2017*

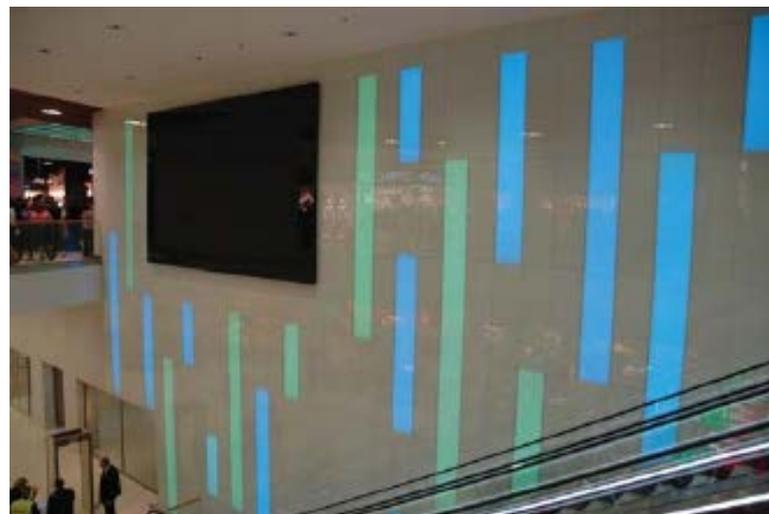
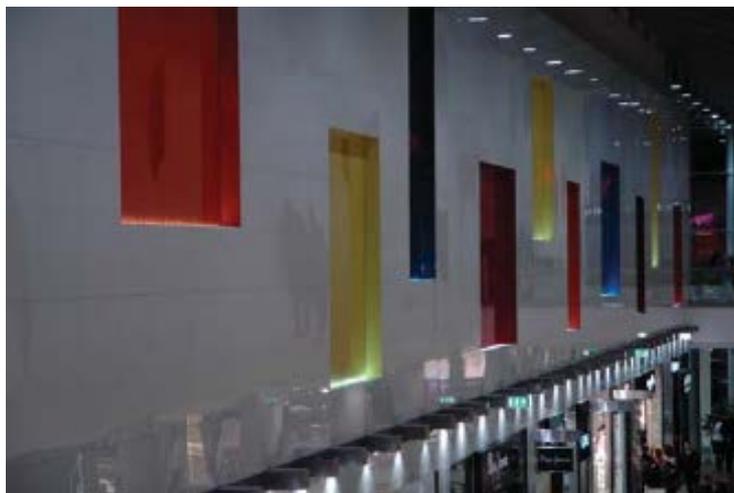
# Alle Center Mall, Budapest

Investment: 330.000 Eur

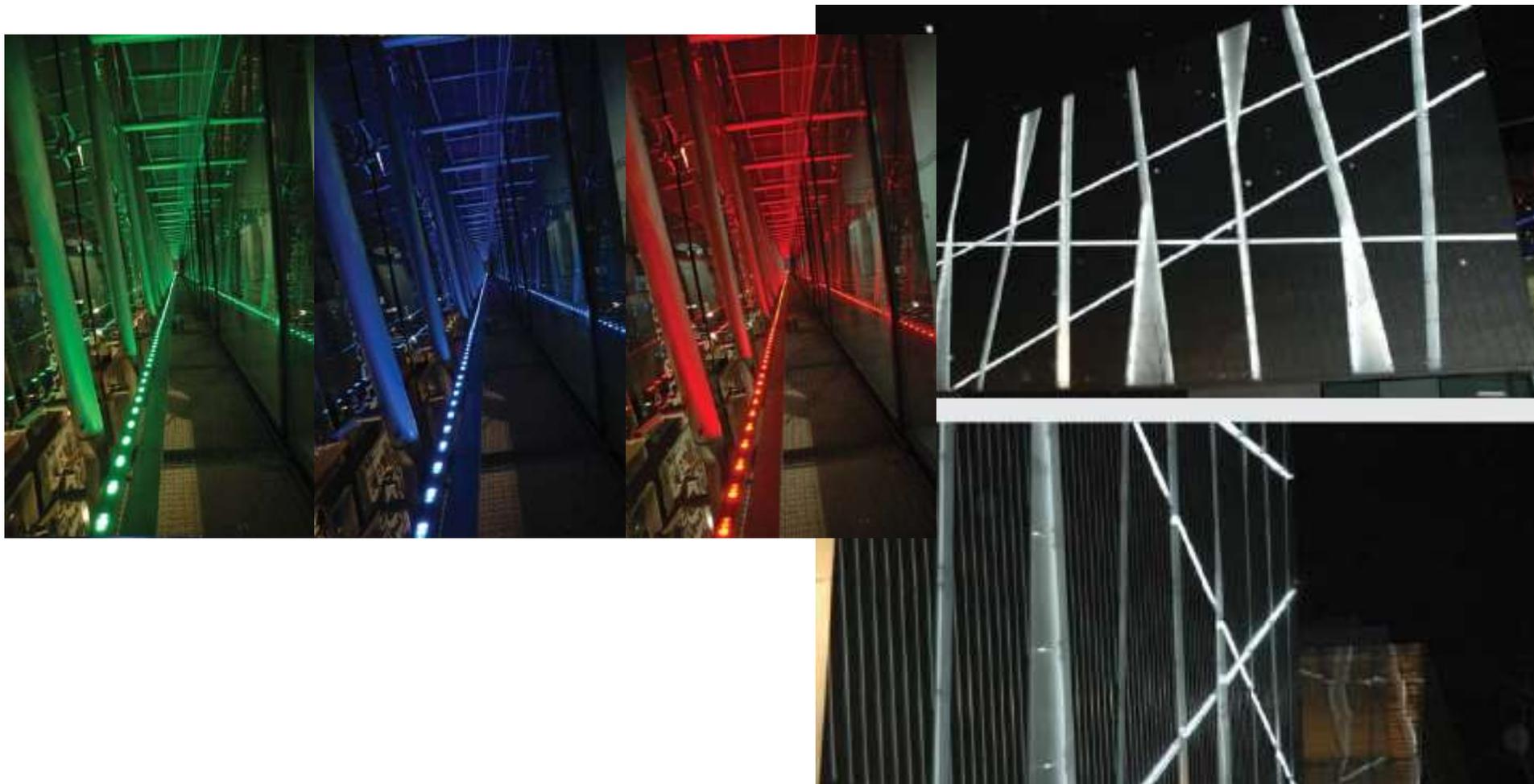
- **Partner:**  
Gordius Zrt.
- **Date:**  
November  
2009
- **Business target:**  
to realize the  
ornament  
lighting  
concept of an  
English design  
firm appointed  
by the investor



# Alle Center Mall, Budapest



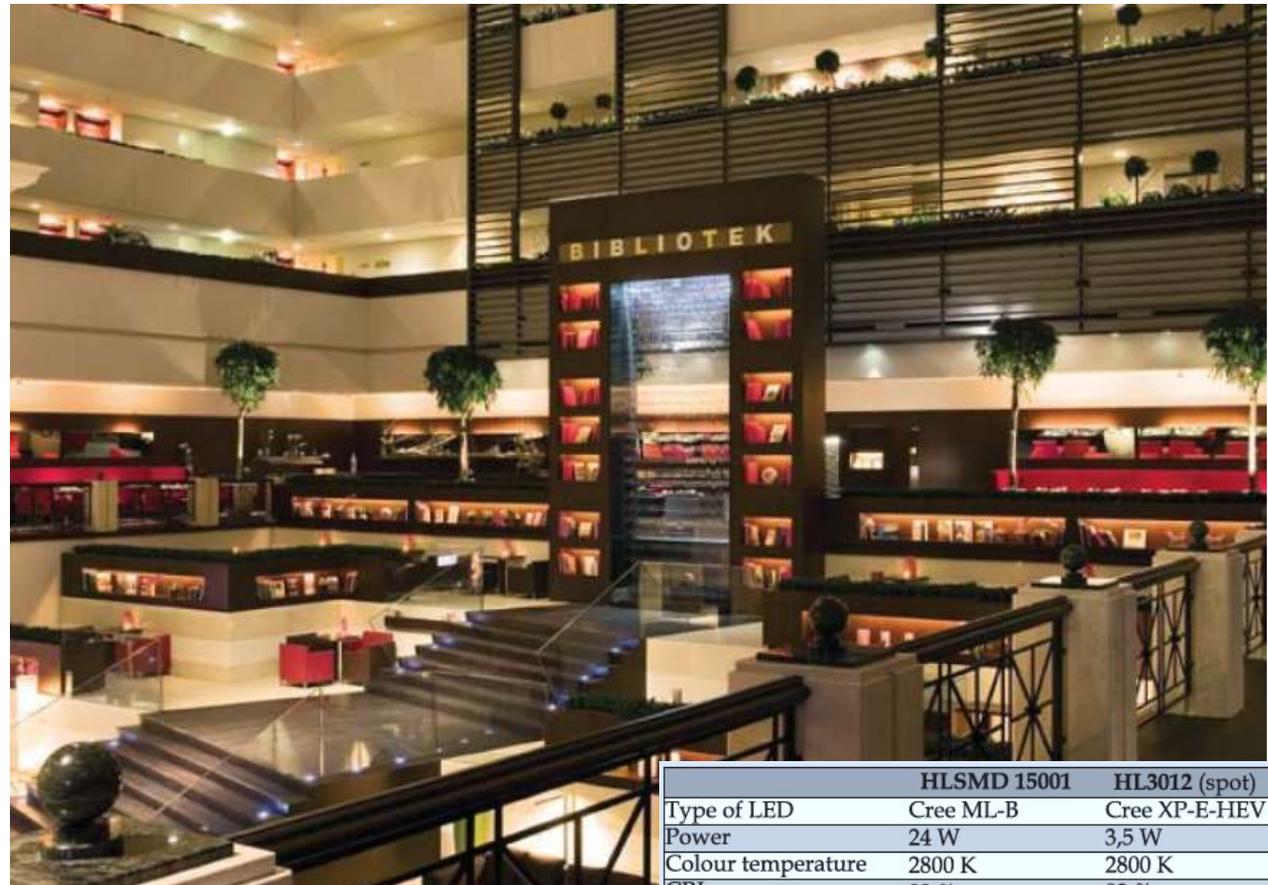
# Alle Center Mall, Budapest



# Hotel Sofitel, Budapest

Investment: 142.000 Eur

- **Partner:**  
Accor Group
- **Date:**  
November 2011
- **Business target:**  
to reduce energy costs & environmental load
- **Payback time:**  
20 months



	HLSMD 15001	HL3012 (spot)
Type of LED	Cree ML-B	Cree XP-E-HEV
Power	24 W	3,5 W
Colour temperature	2800 K	2800 K
CRI	92 %	92 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs (min)	100.000 hrs (min)

# Hotel Sofitel, Budapest



# Hotel Sofitel, Budapest



# State Motorway Management Co. Ltd., Hungary

Investment: 45.000 Eur

- **Partner:**  
State Motorway  
Management Co.  
Ltd.,  
Hungary
- **Date:**  
December 2009
- **Business target:**  
to provide  
outstanding  
optical and visual  
service level, to  
reduce energy  
costs &  
environmental  
load





# State Motorway Management Co. Ltd., Hungary

PEARLLIGHT LED 36 G SERIES			
Order Number	Pearllight 36-45 G	Pearllight 36-60 G	Pearllight 36-92 G
Number of LEDs	36	36	36
Voltage (AC)	230	230	230
Total Power consumption (primary) [W]	45	60	92
Amperage (mA)	350	500	700
Power Factor	0,942	0,942	0,942
Colour Temperature (K)	2700; 4000	2700; 4000	2700; 4000
Tsp (Thermal Soldier Point - °C)	60	60	60
<b>System Total Output (lm)</b>	<b>3855</b>	<b>5315</b>	<b>7070</b>
Typical light output of LED (lm/W)	139	139	139
Protection	IP 66	IP 66	IP 66
Warranty	5 years	5 years	5 years
Road Classification	ME4	ME5	ME4, ME3
Replacement sodium lamp sec./prim.[W]	HPS 70/80	HPS 100/115	HPS 150/180





# State Motorway Management Co. Ltd., Hungary





# State Motorway Management Co. Ltd., Hungary



©2014 HungaroLux Light

PearlLight

# UkrNafta Dnepropetrovsk, Ukraine

Investment: 30.000 Eur

- **Partner:**  
UkrNafta,  
Ukraine
- **Date:**  
October 2010
- **Business target:**  
to provide  
outstanding  
optical and visual  
service level, to  
reduce energy  
costs &  
environmental  
load
- **Payback time:**  
4 years



# UkrNafta Dnepropetrovsk, Ukraine



# UkrNafta Dnepropetrovsk, Ukraine

PEARLLIGHT LED 48 G SERIES			
Order Number	Pearllight 48-60 G	Pearllight 48-85 G	Pearllight 48-120 G
Number of LEDs	48	48	48
Voltage (AC)	230	230	230
Total Power consumption (primary) [W]	60	85	120
Amperage (mA)	350	500	700
Power Factor	0,942	0,942	0,942
Colour Temperature (K)	2700; 4000	2700; 4000	2700; 4000
Tsp (Thermal Soldier Point - °C)	65	65	65
<b>System Total Output (lm)</b>	<b>5080</b>	<b>7000</b>	<b>9300</b>
Typical light output of LED (lm/W)	139	139	139
Protection	IP 66	IP 66	IP 66
Warranty	5 years	5 years	5 years
Road Classification	ME5	ME4, ME3	ME3, ME2
Replacement sodium lamp sec./prim.[W]	HPS 100/115	HPS 150/180	HPS 250/285

HLC-250/95	
Type of LED	Cree MX6 or MX6S
Power	95 W
Colour temperature	4000 K
CRI	92 %
Enviroment (Ta)	50°C
Expected lifetime (L70)	100.000 hrs (min)

# Raiffeisen Bank Office, Budapest

Investment: 12.000 Eur

- **Partner:**  
Raiffeisen Bank Zrt.
- **Date:** May 2011
- **Business target:**  
to reduce energy costs  
& optimize business  
service and working  
conditions
- **Payback time:**  
2,5 years



	HLSMD 6001	HLSMD Universal 64 (recessed downlight)
Type of LED	Cree ML-B	SMD 5050
Power	12,7 W	14,5 W
Colour temperature	3000 K	2800 - 4000 K*
CRI	92 %	80-85 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs	100.000 hrs (min)

\*(by customers request)



# Raiffeisen Bank Office, Budapest



# Germany, more than 400 municipalities

- **Partner:**  
LIS GmbH,  
Germany
- **Date:**  
2011-2014
- **Business target:**  
to provide  
outstanding optical  
and visual service  
level, to reduce  
energy costs &  
environmental load
- **Payback time:**  
12-16 months





Germany, more than 400 municipalities





# Germany, more than 400 municipalities



# Germany, more than 400 municipalities

PEARLLIGHT LED 48 G SERIES			
Order Number	Pearllight 48-60 G	Pearllight 48-85 G	Pearllight 48-120 G
Number of LEDs	48	48	48
Voltage (AC)	230	230	230
Total Power consumption (primary) [W]	60	85	120
Amperage (mA)	350	500	700
Power Factor	0,942	0,942	0,942
Colour Temperature (K)	2700; 4000	2700; 4000	2700; 4000
Tsp (Thermal Soldier Point - °C)	65	65	65
<b>System Total Output (lm)</b>	<b>5080</b>	<b>7000</b>	<b>9300</b>
Typical light output of LED (lm/W)	139	139	139
Protection	IP 66	IP 66	IP 66
Warranty	5 years	5 years	5 years
Road Classification	ME5	ME4, ME3	ME3, ME2
Replacement sodium lamp sec./prim.[W]	HPS 100/115	HPS 150/180	HPS 250/285

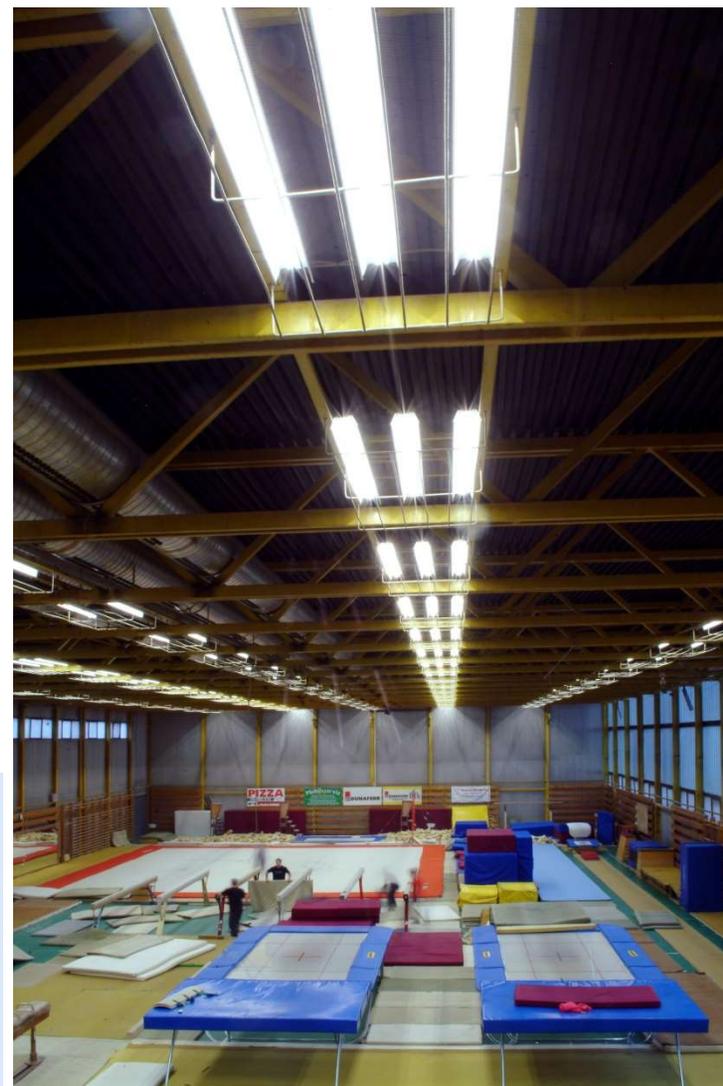
# Sports Hall, Dunaújváros

Investment: 22.000 Eur

- **Partner:**  
Dunaújváros Önkormányzat
- **Date:** Dec 2011
- **Business target:**  
to reduce energy costs  
& optimize service  
and working  
conditions
- **Payback time:**  
2,1years

	HLSMD 6001	HLSMD Universal 64 (recessed downlight)
Type of LED	Cree ML-B	SMD 5050
Power	12,7 W	14,5 W
Colour temperature	3000 K	2800 - 4000 K*
CRI	92 %	80-85 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs	100.000 hrs (min)

\*(by customers request)



# Sports Hall, Dunaújváros



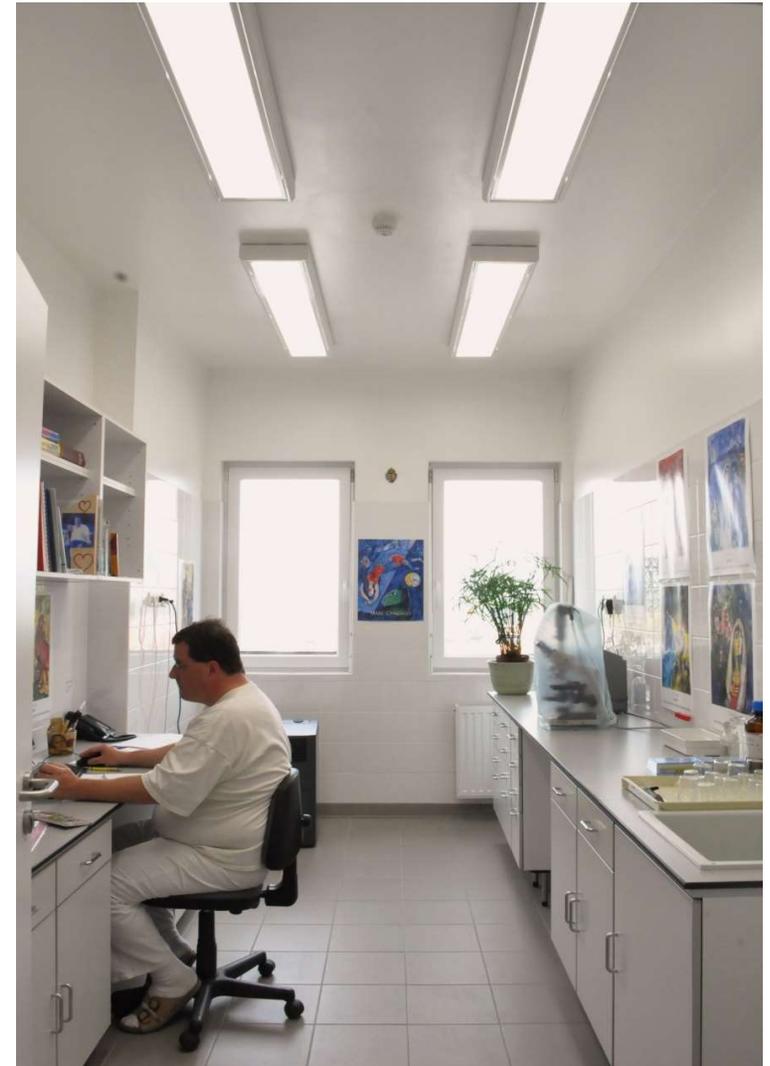
# DMRV (Dunamenti Regionális Vízmű), Vác

Investment: 13.000 Eur

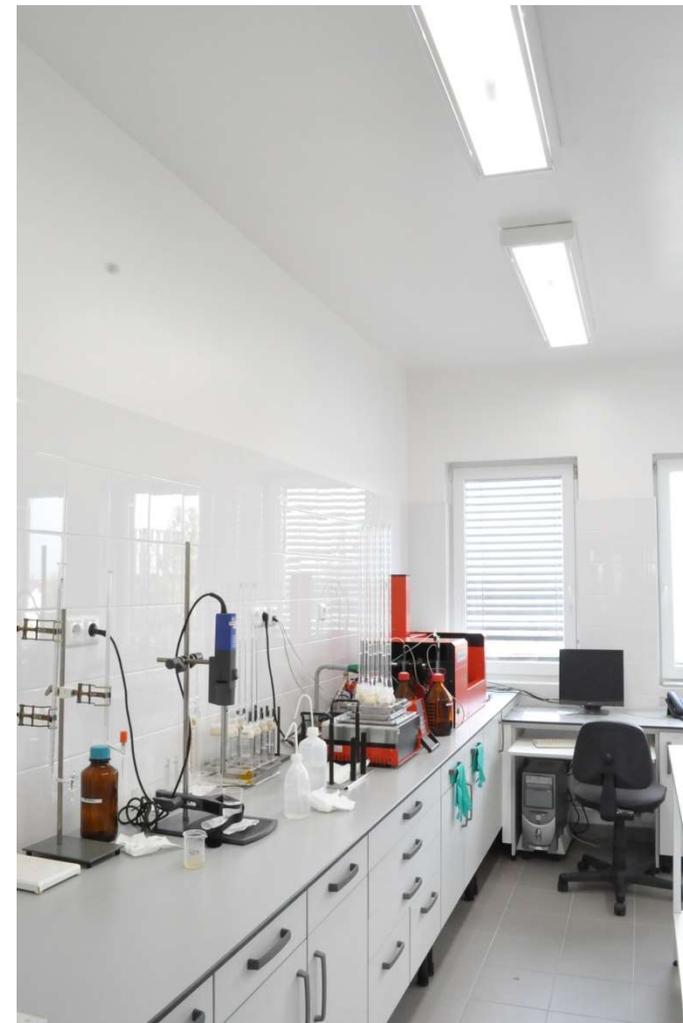
- **Partner:**  
DMRV
- **Date:** June 2012
- **Business target:**  
to reduce energy costs  
& optimize business  
service and working  
conditions
- **Payback time:**  
3,5 years

	HLSMD 6001	HLSMD Universal 64 (recessed downlight)
Type of LED	Cree ML-B	SMD 5050
Power	12,7 W	14,5 W
Colour temperature	3000 K	2800 - 4000 K*
CRI	92 %	80-85 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs	100.000 hrs (min)

\*(by customers request)



# DMRV (Dunamenti Regionális Vízmű), Vác



# MOM Park Mall, Budapest

Investment: 66.000 Eur

- **Partner:**  
PNB Paribas
- **Date:**  
February - March 2012
- **Business target:**  
to reduce energy costs  
& optimize rental fees
- **Payback time:**  
2 years

	HLSMD-15001	HLSMD Universal-64 (recessed downlight)
Type of LED	Cree ML-B	SMD 5050
Power	31,6 W	14,5 W
Colour temperature	3000 K	2800 - 4000 K*
CRI	80-85 %	80-85 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs (min)	100.000 hrs (min)

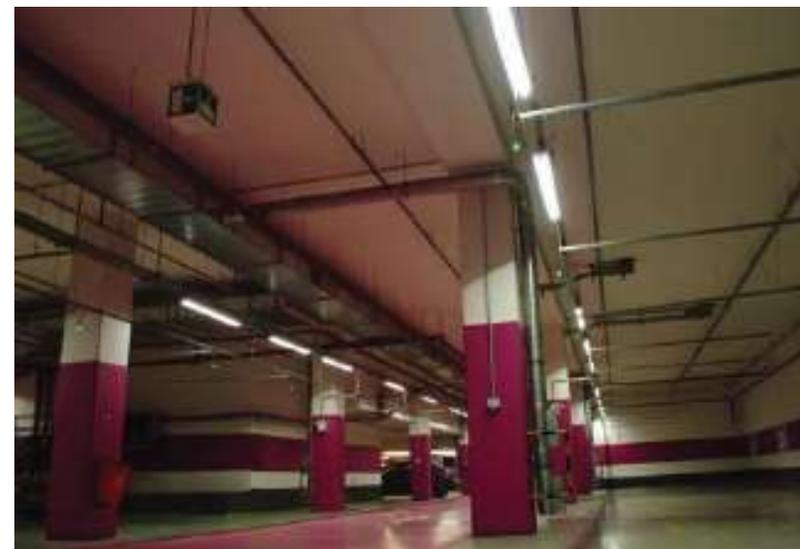
\*(by customers request)



# MOM Park Mall, Budapest



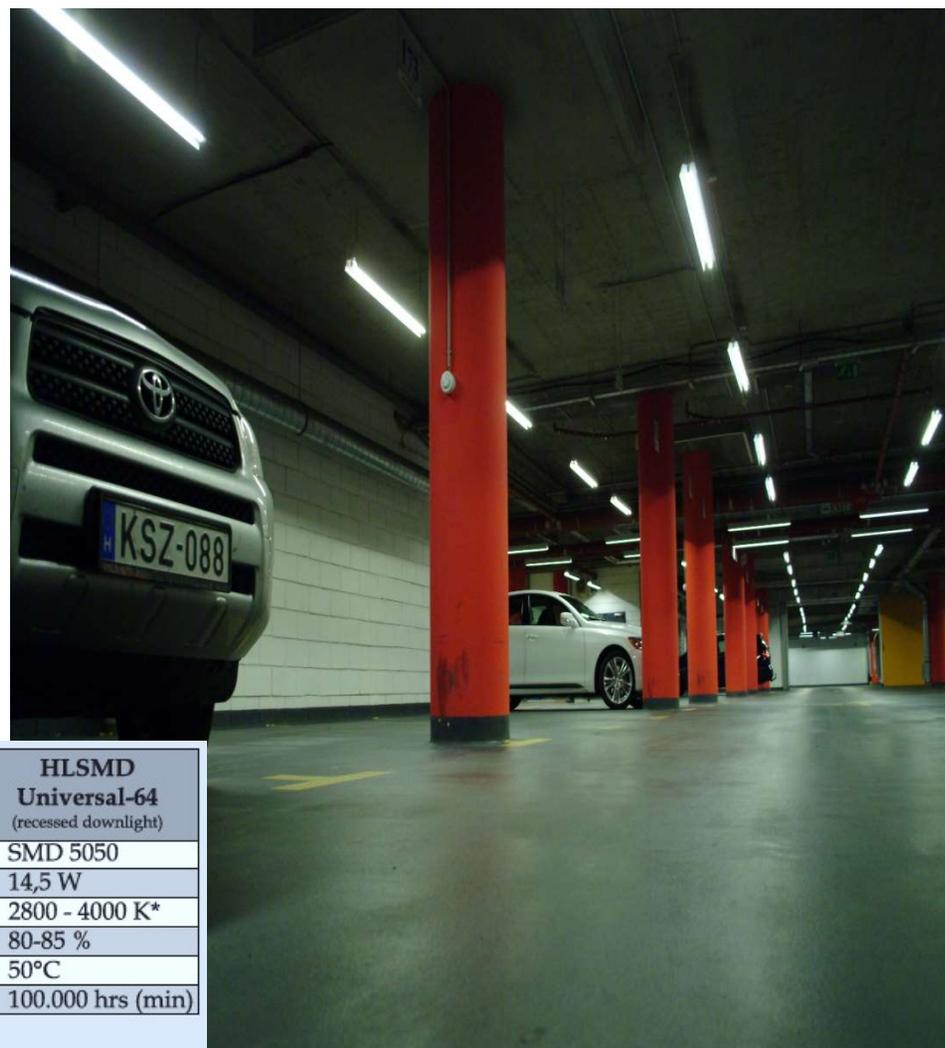
# MOM Park Mall, Budapest



# WestEnd Business Center, Budapest

Investment: 43.000 Eur

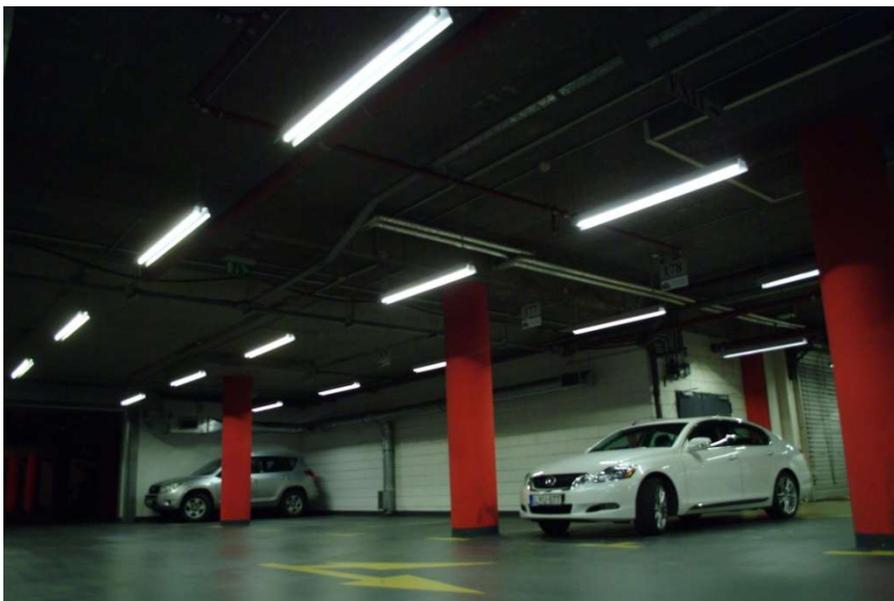
- **Partner:**  
PNB Paribas
- **Date:**  
December 2012
- **Business target:**  
to reduce energy costs  
& optimize rental fees
- **Payback time:**  
1,9 years



	HLSMD-15001	HLSMD Universal-64 (recessed downlight)
Type of LED	Cree ML-B	SMD 5050
Power	31,6 W	14,5 W
Colour temperature	3000 K	2800 - 4000 K*
CRI	80-85 %	80-85 %
Environment (Ta)	50°C	50°C
Expected lifetime (L70)	100.000 hrs (min)	100.000 hrs (min)

\*(by customers request)

# WestEnd Business Center, Budapest



# Hejőkeresztúr, Hungary

Investment: 85.000 Eur

- **Partner:**  
Hejőkeresztúr  
Önkormányzat,
- ÉMOP
- **Date:**  
April 2013
- **Business target:**  
to provide outstanding  
optical and visual service  
level, to reduce energy

## Uniqe features:

- **Dual-way, interactive communication**
- **Individual smart metering and dimming system**
- **Ready to use with different**
- **Smart Grid solutions**
- **No need to install extra wiring**



# Hejőkeresztúr, Hungary

Investment: 85.000 Eur



# Győr, Hungary

Investment: 65.000 Eur

- **Partner:**  
Prolan Zrt.
- **Date:**  
November 2014
- **Business target:**  
to provide outstanding optical and visual service level, to reduce energy

#### Unique features:

- **Dual-way, interactive communication**
- **Individual smart metering and dimming system**
- **Ready to use with different**
- **Smart Grid solutions**
- **No need to install extra wiring**



# MOL Petrol Stations

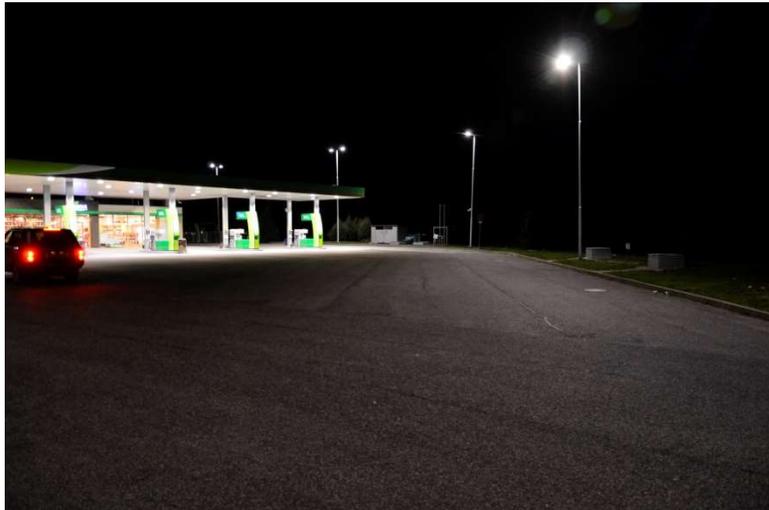
Investment: 860.000 Eur

- **Partner:**  
Cyeb
- **Date:**  
November 2014
- 60 stations
- **Business target:**  
to reduce energy costs  
& optimize rental fees
- **Payback time:**  
2,3 years



# MOL Petrol Stations

Investment: 860.000 Eur



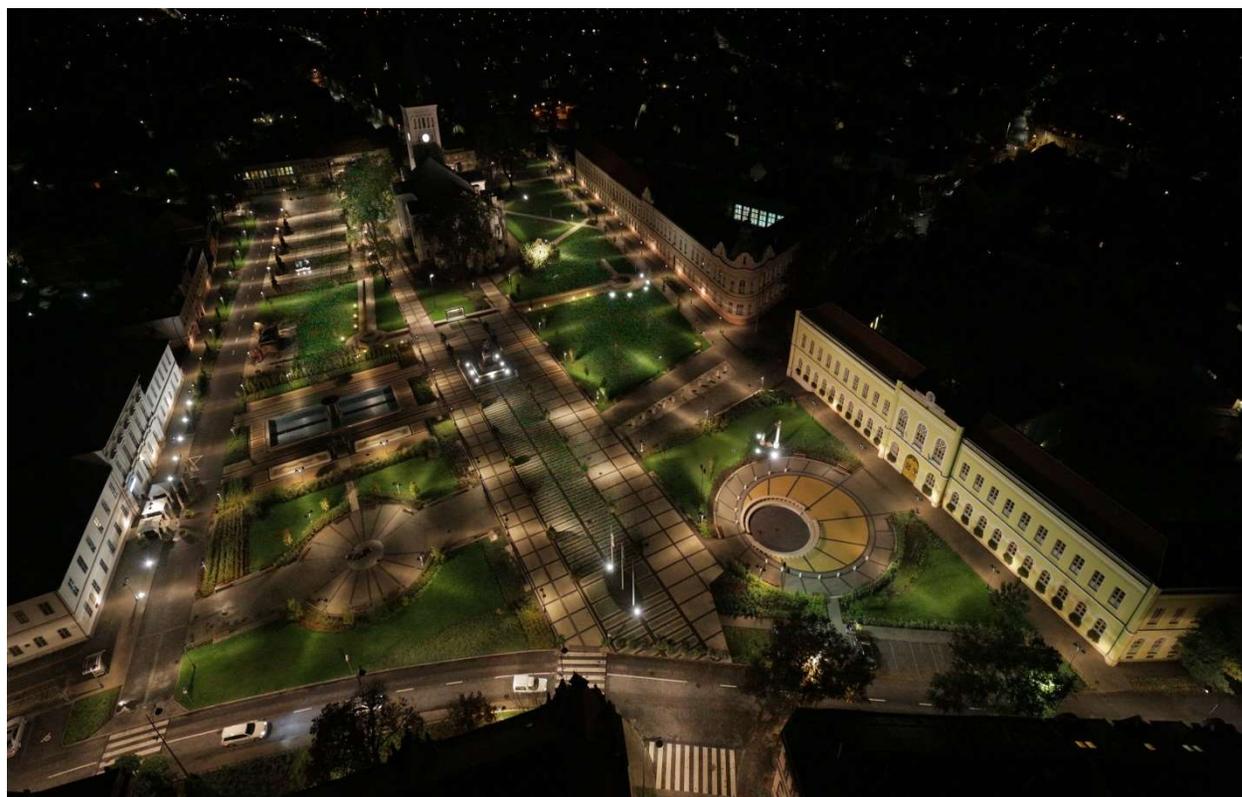
# Hajdúböszörmény, Hungary

Investment: 1,250,000 Eur

- **Partner:**  
Elios Zrt.
- **Date:**  
November 2015
- **Business target:**  
to provide outstanding optical and visual service level, to reduce energy

## Uniqe features:

- **Dual-way, interactive communication**
- **Individual smart metering and dimming system**
- **Ready to use with different**
- **Smart Grid solutions**
- **No need to install extra wiring**



# Hajdúböszörmény, Hungary



# Dombóvár, Hungary

Investment: 600,000 Eur

- **Partner:**  
U-Light Kft.
- **Date:**  
Április 2017
- **Business target:**  
to provide outstanding  
optical and visual service  
level, to reduce energy

#### Uniqe features:

- **Dual-way, interactive communication**
- **Individual smart metering and dimming system**
- **Ready to use with different**
- **Smart Grid solutions**
- **No need to install extra wiring**



# Dombóvár, Hungary

