# INDUSTRIAL LIGHTING JSC.
# LED LIGHTING – NEW TECHNOLOGY WITHOUT ALTERNATIVE

LED revolution gave the world fundamentally new quality light source - an event equal in importance to the invention of the steam engine, the filament lamp, television and the transistor. It's not just another technical achievement but a cardinal transformation of the living environment of people with its light, color and data components. Today LED project is a task for which work hundreds of research laboratories and dozens of large transnational companies worldwide with billions investment and turnovers - a fact confirming the significance of the event.

## LED - HISTORICAL BACKGROUND

1995 - **Shuji Nakamura invented** the white LED.

2000 - Niygar, Mac Dayarmind and Shirakawa received the Nobel Prize in Chemistry for the discovery and development of conductive organic polymers - materials for organic LED (OLED).

The first reported discoveries of organic LED are dated in the 50's of the last century. OLED is a new direction of the LED revolution with amazing applications. 2006 – For his ongoing efforts to create cheap and efficient light sources Nakamura was awarded with "Technology of the Millennium" and was "validated" as the leader of the LED revolution.

## ADVANTAGES OF LEDs

Miniature and simple in appearance chip of the white LEDs has concentrated in himself the latest achievements of physics and nanotechnology and is a complex structure of semiconductor layers and phosphors. The application fields of LEDs are virtually unlimited, as one of the most important is their use in street lighting. The following advantages make them light sources with no alternative :

## MAIN ADVANTAGES

1. **Lifetime** - LEDs can have a relatively long useful life - estimates up to 100 000 hours of useful life,(11.5 years continuous glow; for street LED – lamps the useful life is 25 years, for home LED – lamps – 40 years ) After that period the diode continues to glow but with lower intensity.

- we use a high power LED's and the manufacturer Osram guarantees 50,000 hours of operation.
In official talks with the technical direction of the company we have been given assurances of non-alteration of the lighting parameters of LEDs for 80,000 hours;
- It is important to know that the diodes do not burn ,over time the light emitted from them only reduces (therefore reduces their consumption of electricity);
2. **High reliability** – The extremely high reliability stems from a long technical life. LEDs are the most reliable known source of light.
- in the project performed 3 years ago were installed 200 pcs 40watt diode street lamps that operated in severe weather conditions, with the temperature differences of +40°C to -40°C.

So far we have no defective lamp;

3. **Environmental cleanliness** - LEDs do not contain within itself dangerous to human elements (unlike, for example of mercury, sodium and conventional fluorescent lamps). They are fully recyclable. Not emit any harmful emissions (lack of ultraviolet and infrared radiation, which are harmful to eyes and surrounding objects). Emit negligible heat. No glass housing. Indirectly improve the environmental situation in the world – the lower consumption reduces the load on power plants thereby reducing harmful emissions into the atmosphere - a prerequisite for reducing the greenhouse effect.
- to maintain the ecological effect in the production of our lamps the entirely lead-free soldering technology is used and the basic elements can be recycled and re-used in the production of next generation diode lighting;
4. Random color - white LEDs themselves and the combinations of monochrome color LEDs can emit virtually light controllable (programmable) random color. Only LED-lamps can produce light across the color temperature range, including and 6500K - color temperature of natural living white light, which is impossible for conventional street lamps and other lamps as well.
- depending on the requirements of our customers we can rely color temperature that best meets their expectations and desires;

## ENERGY – EFFICIENT ADVANTAGES

5. **High efficiency** - LEDs have a very high efficiency (CPA) - more than 0.9 (against 0.1 for incandescent lamps). Practically, this means the conversion of 90% energy consumption in light and only 10% in losses. In bulbs 9/10-ti of energy is wasted in heat loss. Statistically, in cities the lighting consumes around and over 40% of all produced electricity. In that respect, the high efficiency of LEDs is the real prerequisite for a significant reduction in energy losses.
- losses in the power of our latest generation diode lamps are only 7% as opposed to the conventional ones, which are at about 20%;

- our latest generation of 40-watt lamps, thanks to these low losses and effective light distribution system, achieved efficiency of 76 Lm / W, which exceeds by about 20% world's best manufacturers;

6. **High light-giving** - LEDs have exceptional efficiency of converting electrical energy into luminous flux (light-giving). It is measured in lumens per watt (Lm / W). For comparison - for 250W street mercury lamp its relative value is 16Lm / W, for 100W sodium lamp - 30Lm / W, where for the equivalent LED-lamp - 60Lm / W.
- our lamps successfully replace twice as powerful sodium and three times more powerful mercury lamps, in relation with electry consumption;
7. **Low cost** - LED-lamps reduce costs at times in personal, social, nationally and globally:
- Energy costs – because its low consumption, its high efficiency and high light-giving;
- depending on the type of the exchanged lamps the achieved energy effect results in cost reduction for electricity 2 to 3 times ;
  - The cost of maintenance and service - because of its high reliability;
- maintenance costs for municipalities, we work with, also falls between 2 and 3 times;
  - The cost of replacement light sources – because his long technical life.

## PRACTICAL BENEFITS

8. **Without maintenance** - For all their technical life LEDs do not require maintenance and service.

9. **Safety** - LEDs work in electrical and electronic system with small current at very low voltages - from 5V to 24V - completely safe for humans.

10. **Mechanical resistance** - LEDs are resistant to vibration and shock, they don't have elements that can be damaged mechanically or which may be broken (for example, glass block).
- low operating temperatures of LED lamps allow replacement of widely used until now reflectors made of tempered glass with super strong polycarbonate;
- when tested,our models withstand direct fire from air rifle;

11. **Resistance to moisture** - moisture-resistant LEDs are electronic components and can operate at a high level of humidity without changing its parameters.
- our luminaires have IP66, allowing better sealing, which in turn is directly related to their duration of life;
12. **Working without heating** - LEDs because of their high efficiency, have low operating temperatures (up to 1000S within the crystal itself and up to 600S the

corps itself) and emit very little heat. Practical heating is negligible.

13. **Working in difficult conditions** - LEDs have high efficiency when operating in harsh operating conditions.
- our sales in the Russian market have led to the development of lamps, operating at the extremely low temperatures - from over -40°C;

14. **Simple operation** - LEDs do not require a starter and ballast for its launch. As electronic components operating at low voltages and having a simple structure they can be easily managed with simple and cheap circuit solutions.

15. **Without optics / reflectors** - Various performances of the body of LEDs can achieve a random distribution of luminous flux in the space: uniformly in all directions or narrow beam. Unlike the famous lights they do not use external optics and complex mirror-lens and reflector structures (where there is light loss).
- our developments in the field of optics for LED lighting allow achievement of very good uniformity in a spot lit perimeter;

16. **Constant color** - Unlike conventional street lighting LED-lamps emit light with a constant color temperature (color), regardless of its intensity.

17. **Miniature size** - volume of the radiating area of a powerful white LED is several thousand times smaller than the volume of conventional tungsten filament lamps. This allows the creation of an extremely compact light sources ( low-tanks materials ) and aesthetically shaped lighting fixtures.

18. **Fire** - Due to their low operating temperatures and materials from which they are made, the diodes are fire-safe.
- lamps have a certificate allowing the immediate installation on walls without the danger of fire;

19. **Autonomous operation** - Due to extremely low levels of consumption and small working voltage lighting LED-units can be powered by solar panels, which saves electricity. Through these solar systems is possible even illumination in locations where there is no electrical power network.

- our first developments in the field of diode lights were creating a diode lamp, powered by solar energy. We have a wide range of solar lightings, using elements of the 230-volts lamp;

20. **Intelligent control** system - Based on the products LIGHT WINGS, we offer intelligent control system. The system allows for centralized remote management and diagnosis of multiple luminaries without limitation of their amount and location. The structure is based on wireless connections and free radio frequencies. Thus avoiding the need to spend cables or licensing of radio frequencies and to achieve greater flexibility and lower cost of the product. The established system enables the management and diagnosis of lighting in all size communities, neighborhoods, boulevards, individual streets (as for tunnels and highways, it allows also traffic management). The system allows decreasing in electro consumption up to 30%.