

Optics Design in COB LED

In order for the LED lighting market to increase rapidly, there are requirements for high power low cost LED lighting products. COB LED is a new LED light source module technology which attaches integrated circuit on the substrate in COB (Chip On Board) form instead of POB (Package On Board) form. COB LED is receiving much attention as a new technology that will reduce the price of LED lighting.

KHATOD OPTOELECTRONIC S.R.L

We are all aware that the Energy Conservation is the most important problem that the World shall face during the next few years. In this scenario, the Lighting

Fixtures play a fundamental role: if they were totally replaced by low energy consumption appliances based on alternative energy sources such as the LEDs, we would avoid to discharge million and million tons of carbon dioxide in the atmosphere.

This is one of the main reason why LED Lighting has been developing so quickly in the latest years, either concerning the LED sources or regarding the optical solutions dedicated to them.

The requests from the market are more and more demanding: high efficiency in Lighting, long-life products along with the utmost necessity of energy conservation. This has led the product developers to project and realize SSL systems able to deliver excellent performances in terms of lighting flux, long lasting, energy conservation, cost-efficiency, while guaranteeing the best Return-On-Investment.

Focusing on the development of LED Lighting technology has also helped to ensure a more aware and mature Lighting Industry. The products delivered on the markets, both LED sources and optical solutions, are more and more specific and well targeted to the final lighting application for which they have been designed.

The most recent developments in LED Technology have produced new devices such as the COB LEDs – Chip On Board LEDs - which allow many diverse LED configurations never considered before.

The high luminosity of the COB LEDs is achieved through a unique packaging in the tightest space, allowing to perform high intensities. It results that

the selection of the most proper optical system is a matter of primary importance: the optical design and the polymers used for the manufacturing process must not only comply with the optical parameters but also with the mechanical requirements in order to guarantee the best performance.

Therefore, the selection of the optical system as well as the technology to realize it, is still a question that often has no immediate answer: Lens or Reflector?

The initial element is the LED and its characteristics that can be summarized in few peculiarities:

- Compact light
- High luminous flux
- Hemispherical emission (Lambertian)

The other important element is the final application: it determines the most proper optic to use.

Therefore, it is just the combination of these two elements – LED and Final Application – to determine the right optic to choose. As a general consideration, LEDs which direct the light into a tight beam, currently achieving 90°, will have a great performance with a lens. Instead, the HB COB LEDs which spread the light up to 140° and over, will surely optimize their performance by using a reflector.

In any case, both lenses and reflectors need to be designed correctly and for a specific model of LED. The most important thing is that their focal point has to match perfectly with the spot in the LED die.

Only in this way either a lens or a reflector can capture the side light as well as the forward light, focus it perfectly, and reach the highest efficiency level.

The COB LEDs – Chip On Board LEDs - allow a huge variety of new and innovative applications in

Lighting.

The high-level packaging density of the LED chips allows to perform high intensities while delivering a perfect homogeneous flux. However, as any LED source, also the COB LEDs need a proper optical solution to optimize their high power for a brilliant performance.

Khatod, a real front-runner in Lighting solutions, as usual, has immediately intercepted this new demand from the Lighting market, and has promptly delivered on the market the full series of LYRA Optical Reflector Systems, optical solutions specifically designed for this new generation of COB HB LEDs.

LYRA Optical Reflector

LYRA Optical Reflector Systems from Khatod provide the designers of lighting fixtures the broadest selection of optical solutions, by offering a real "Can do" opportunity in the most advanced projects using the High Brightness COB LEDs of latest generation.

The huge range of LYRA reflectors is available in 2 main macro-families, offering models of 65mm and 90mm in diameter. Each one of these macro-families comprises reflectors either with metalized or embossed finish, enabling to select the most proper reflector depending on the LED source you are using in your application. Each model delivers an extensive range of beams, from narrow to medium, wide and super-wide angles, generated by the different geometries of the inner surface of each single model. LYRA Reflectors are provided with special adaptors, customized for the individual models of the major HB COB LEDs. The adaptors allow for the interchangeability of the LYRA reflector models on the same LED source.

The assembly method is unique and easy to use. No soldering or gluing is required. They allow immediate easy assembling of the reflector onto the COB LED by a simple twist & lock system.

LYRA Optical Reflectors are in compliance with Standards and fit most of the applications where

COB LEDs are required.

LYRA reflectors boast the latest in technology and the highest in quality. Made of special PCMT, aluminum coated and with protective layer, they deliver an excellent optical efficiency based on our exclusive VACUUM COATING TREATMENT PLANT, custom-engineered for the specific optical treatments of khatod Reflector Systems for LED applications.

The vacuum treatment plant from Khatod is not a common equipment for general use, as most of the coating plants available on the market. Instead, Khatod plant is customized for specific optical treatments. It has been projected and realized exclusively for the specific coating of optical reflectors for COB LED applications.

This allows to achieve superior optical performances, up to 37% higher than the optical efficiency of the common reflectors currently treated through a standard coating process. Also, such innovative technologies allow the treatment of plastic materials of new generation, heat-resistant over 250°C (482°F), because the vacuum ensures the ideal conditions needed for a perfect uniform and compact coating.

The treatment process includes also the Plasma technology. Plasma is the fourth state of the matter, a gas which can be partially or totally ionized, consisting of free charged particles, such as neutral molecules, ions and electrons, simultaneously present. In this case, Plasma stays for "low energy content": a higher or a lower energy content defines a "cold" Plasma or a "hot" Plasma.

The entire treatment process is made of four working operations. That is a longer working cycle than usual. However, the innovative technologies for the creation of vacuum allow to keep the costs competitive. Every part produced is not only a hi-tech product but also a cost-effective solution.

A further key issue is the ZERO ENVIRONMENTAL IMPACT of the new Vacuum Treatment Plant from Khatod, totally complying with RoHS and ELV Standards.

The most cutting-edge technologies as well as innovative proceedings introduced in our project and production processes make KHATOD LYRA REFLECTORS the best optical solutions for the new generation of COB LEDs.

Well, "At Khatod, we are well prepared to meet and exceed the needs of the ever-evolving LED Market globally", as the President of Khatod, Mr. Giuseppe Vasta, is used to say.

