

New artificial lighting technologies: light emitting diodes

by Anna Lia Quattroccolo and Sonia Schiavone

Tutor: Chiara Aghemo

The recent and ever increasing use of light emitting diodes as alternative architectural illuminating sources looks today as interesting and exciting as the introduction in the market of the first halogen lamps in the '60s. Any new technology, though, even more when accompanied by emphatic and overstating advertising campaigns – and this is the case with LEDs – inevitably raises doubts and questions that need to be answered in order to make good and conscious evaluations and decisions. This dissertation aims to analyse the limits and potential of solid state lighting applications in the urban and architectural fields, identifying specific implementations as competitive lighting options.



THT RGB LEDs

The first chapter considers a range of artificial lighting sources and systems, as proposed by the most reputed companies in the sector, developed to answer the ever-growing professional requirements. Among these solutions are LEDs. The dissertation highlights their advantages as underlined by the producing companies.

In order to check the reliability of their statements, a deep knowledge of LEDs features is required.

Therefore the Second Chapter is devoted to understand LEDs' functioning and technology, through the main stages of their development, from mere light signals to effective lighting sources. The Third Chapter concludes the history of LEDs and their technology, and gives a brief description of their various types and of the modules presently available in the market and suitable for architectural applications. In the same Chapter we focus on the issues of LEDs photometric features measurement, issues related to the morphological and technological differences between LEDs and the other lighting sources. Starting from a technical report published by the Comité Internationale de l'Éclairage (CIE), we describe specific measurement methods and propose useful comments aimed at a better understanding of the photometric data quoted in the LEDs producing companies' brochures.

In the next step we have gathered information relevant to: a) various equipments presently available in the market and specifically designed or adapted to LEDs; b) already implemented lighting projects with LEDs. Therefore, the Fourth Chapter is a survey of 390 equipments, subjected to a national and international market research, while the Fifth lists and analyzes 112 lighting projects.



Olodum, recessed light by Side



“Luci d’artista”, Fountains of light, Piazza Bodoni in Torino

The final Chapter is a critical summary of the main dissertation points: it is divided into three parts, which follow the sequence of chapter Three, Four and Five. The first section is a performance survey of the LEDs sources, where we scrutinize the single strength points of solid state lighting systems in order to check their reliability on the basis of our information. Section two gives a critical review of the main LED equipments, considered from a morphological and technological point of view. The third section, finally, gives a reasoned analysis of the main solid state lighting application fields, in order to endow designers with some useful tips.

For further information, e-mail:

anna.quattrocolo@libero.it

sonia.schi@libero.it

Maintained by:
CISDA - HypArc, e-mail: hyperc@polito.it