LED 101

A quick guide to LEDs and why they matter to you

What is an LED?

A light-emitting diode, or LED, is a compound semiconductor device that converts electricity into light. One or more LEDs combined with a driver, housing and other components create a complete LED system.

LED CHIP
a layered semiconductor light source

LED PACKAGE
LED chip + lead wires and an epoxy shell

LED SYSTEM
multiple LED packages + supporting electrical, thermal, optical, and mechanical components

What makes a robust LED system?

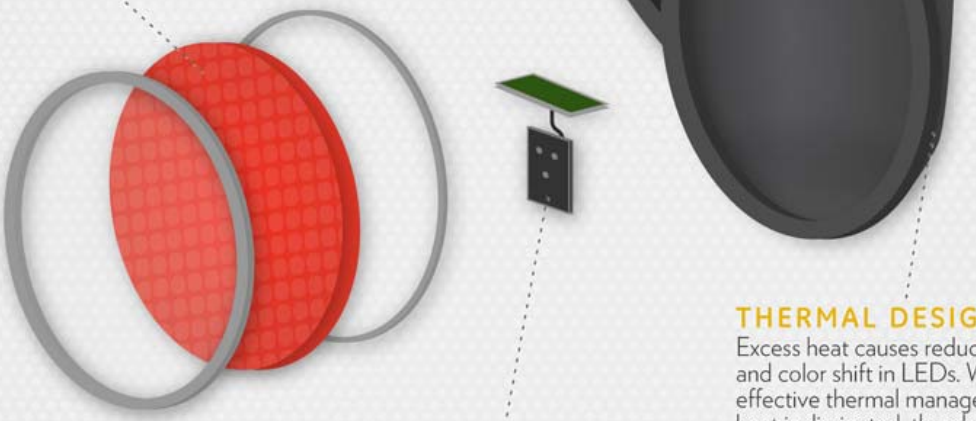
There are four main design factors that determine LED system performance.

MECHANICAL DESIGN

Because LEDs last for years, the materials and construction of an LED system are critical for performance. Careful mechanical engineering protects the LED system from corrosion and humidity to ensure long service life

OPTICAL DESIGN

LEDs are a directional light source, meaning they emit light in a single direction. Through carefully designed reflectors and lenses, light is directed only where it is needed, minimizing wasted light



THERMAL DESIGN

Excess heat causes reduced life and color shift in LEDs. With effective thermal management, heat is dissipated, thereby improving LED performance

ELECTRICAL DESIGN

Electrical design determines the LED lifespan, light output and color control of the LED system. Precise engineering ensures the right amount of electricity is delivered to the LED chip, enabling consistent, long-lasting LED system performance.

What are the benefits of LEDs?

LEDs offer a number of advantages over conventional light sources. LEDs...

- ...contain no mercury, lead, or glass
- ...offer significant energy savings, up to 90% compared to incandescent in traffic signals
- ...last for up to 50,000 hours

- ...are highly resistant to shock and vibration
- ...have excellent cold weather performance

- ...are dimmable
- ...have a quick turn-on time

How can LEDs impact us?

By the year 2030, the US Department of Energy estimates LED lighting could save approximately

190 TERRAWATT-HOURS OF ELECTRICITY per year, which is equivalent to:

the annual output of **24** LARGE POWER PLANTS (1000 MW)

enough electricity to power **95 million** HOMES

and at today's prices **$15 billion** IN SAVINGS

GE Lighting Solutions