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LED Lighting Presentation

State Agency Energy Advisory Group

February 20th, 2013

Prufled.com | 855 PRUFLED (778 3533) | 7333 IH 35 South, Robinson, TX 76706



LED Lighting Technology

- Light Emitting Diodes (LED) – Provides the light source
- Heat Sink – Dissipates heat away from the diodes
- Driver (Power Supply) – Provides electrical current and converts AC to DC.
- Optics

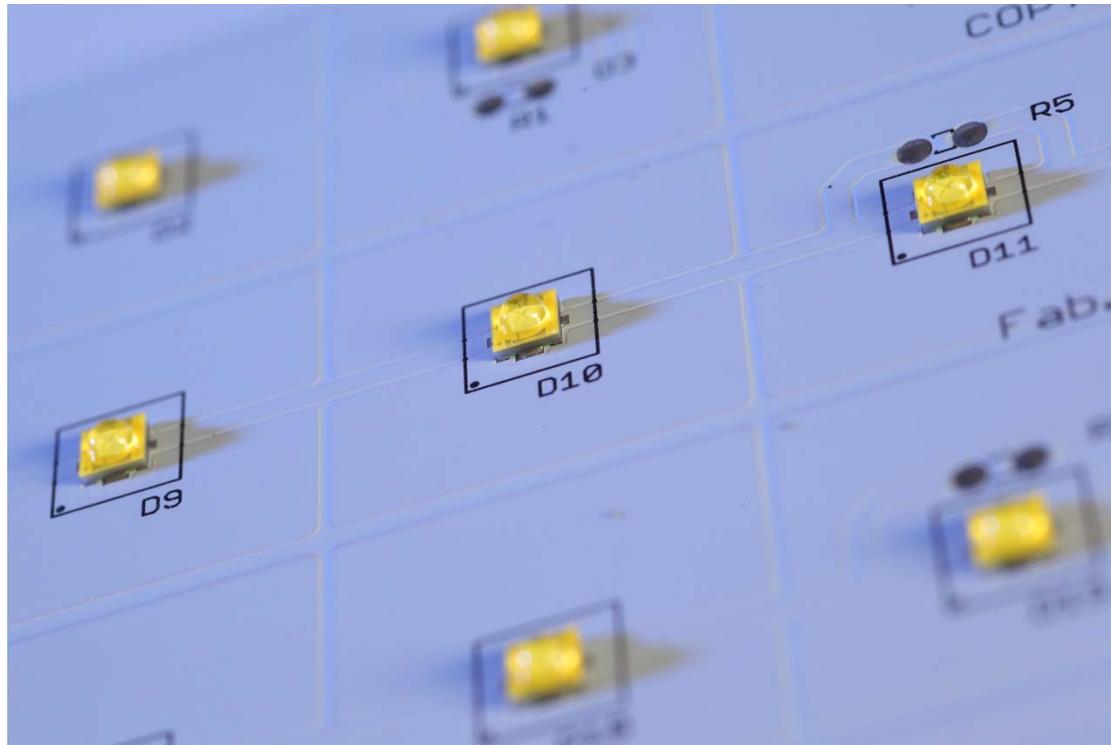


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Light Emitting Diodes (LED)



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Light Emitting Diodes (LED)



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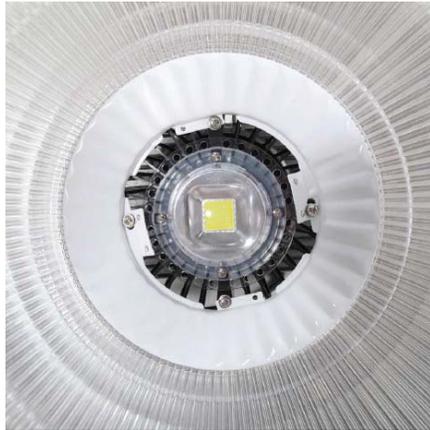
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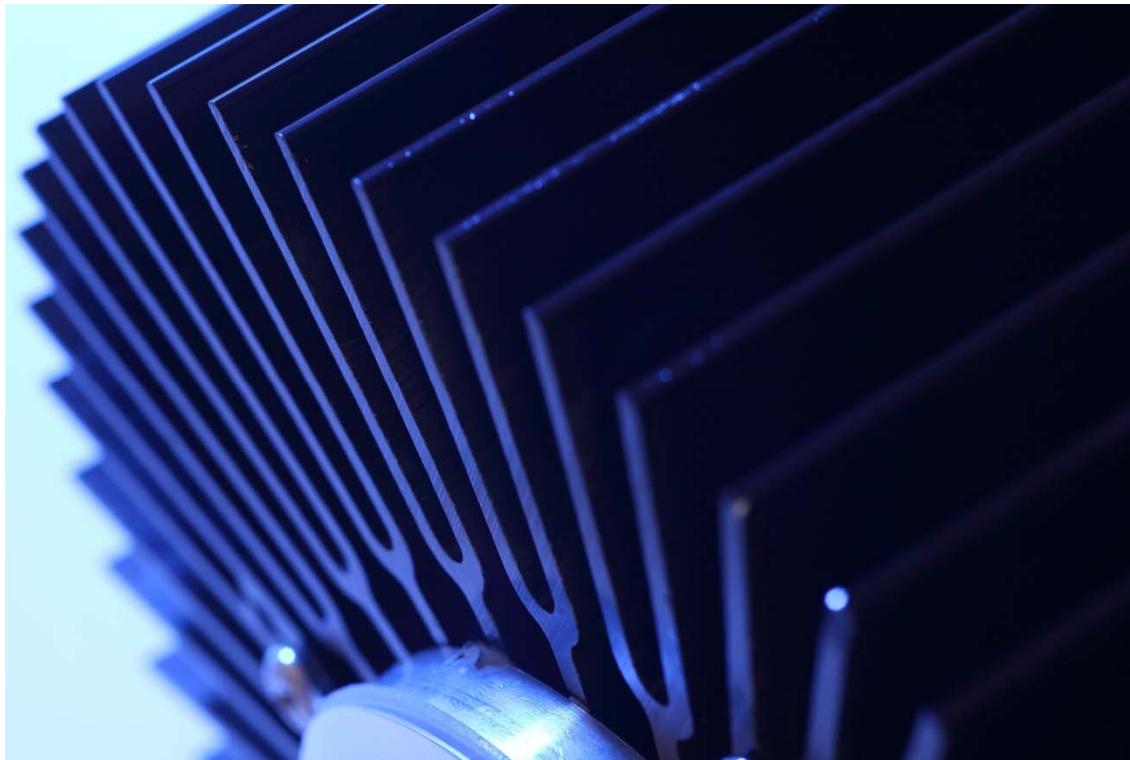


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Heat Sink



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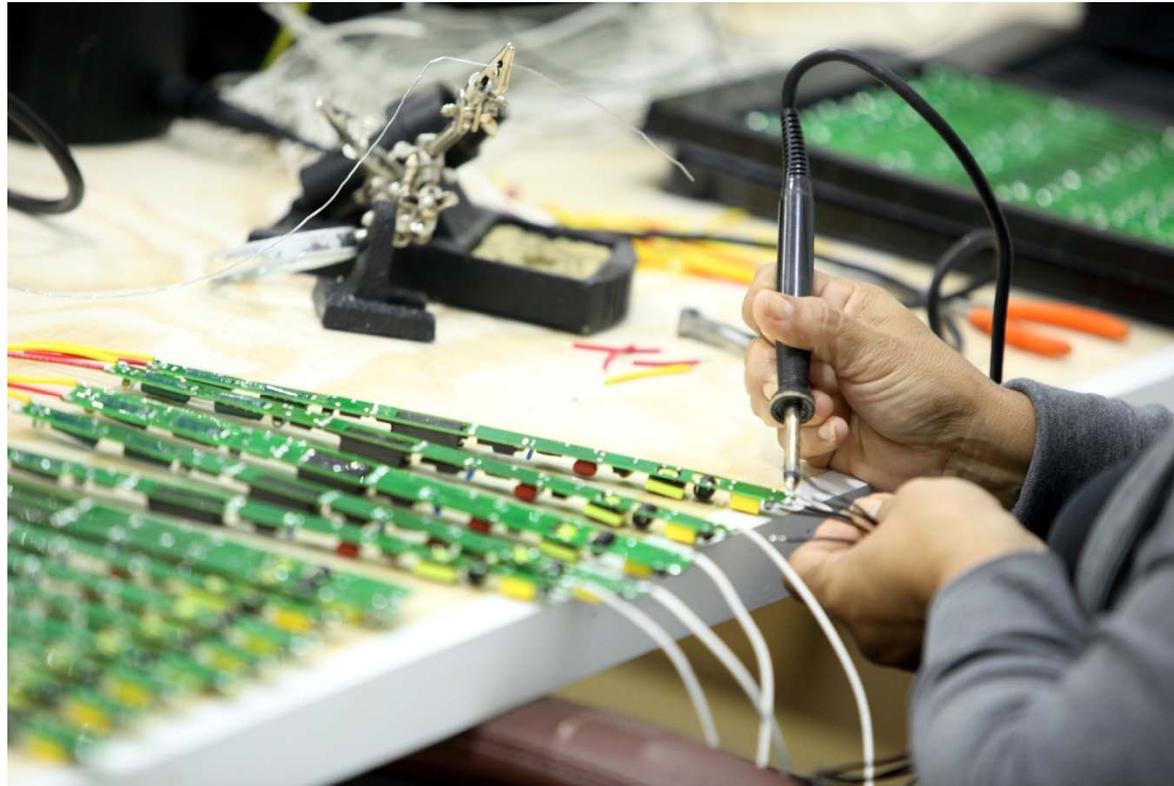
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Driver (Power Supply)



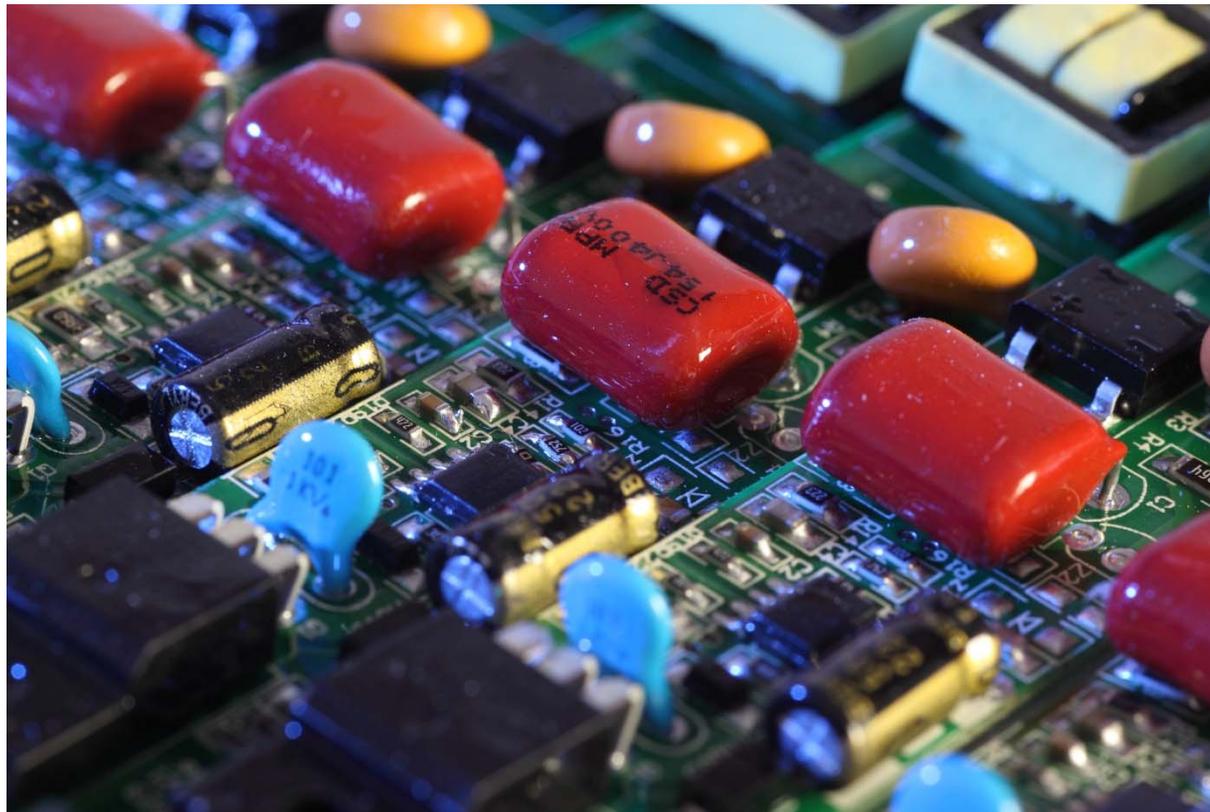
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LED Optics



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LED Light Options

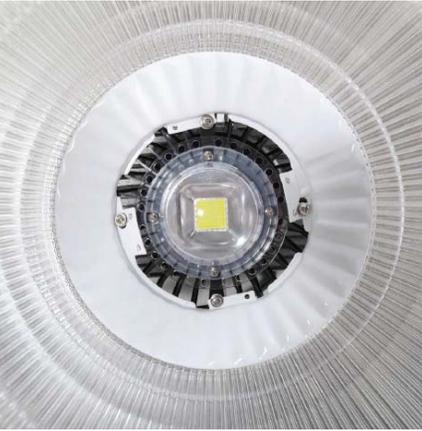


- LED Lamps – Are LED lamps that fit into existing light fixtures to replace traditional lamps.
- LED Retrofit Kits – Are LED lighting kits that replace the traditional lighting components in traditional light fixtures.
- LED Fixtures – Are light fixtures that have LED light components built into the fixture.

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LED Lamps



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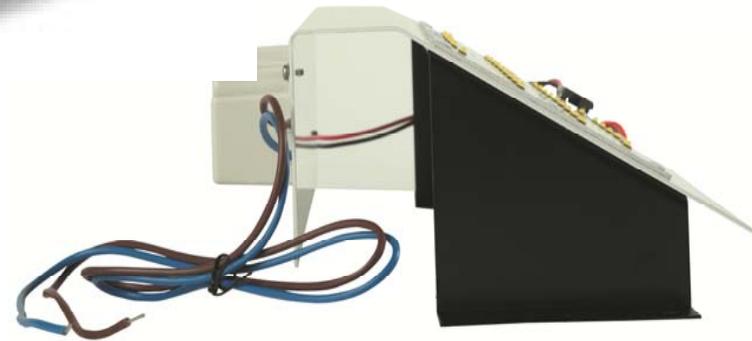
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LED Retrofit Kits



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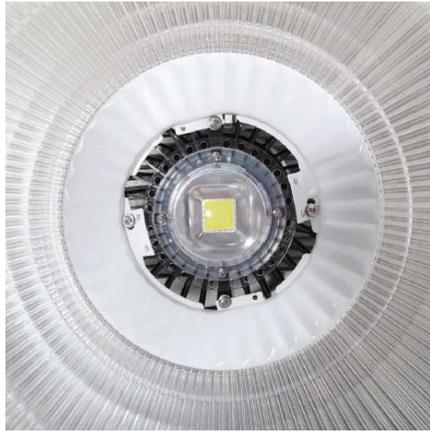
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LED Light Fixtures



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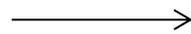


Benefits of LED Lighting

Features

Benefits

Lower Energy Consumption



LED lights consume on average 50% less energy than traditional lighting.

Longer Operating Life



LED lights often last up to 10 times longer than traditional lighting.

Instant Strike Capability



LED lights produce full lumen output instantly when turned on. There is no warming up period or delay to reach full lumen output.

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Benefits of LED Technology

Features

Does Not Emit UV Rays

Does Not Contain Mercury,
or Other Environmentally
Hazardous Chemicals

Extreme Temperature Durability

Benefits

→ LED lights do not emit UV rays. This eliminates the harmful effects to the human body and significantly reduces the attraction of insects.

→ LED lights are recyclable and don't contaminate landfills and water supply with mercury, other harmful chemicals commonly found in traditional light sources.

→ LED lights operate in extreme temperature environments ranging from -30° F to 140° F.

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Benefits of LED Technology

Features

Benefits

Cooler Operating Temperature

—————> LED lights operate at a lower temperature than traditional lighting therefore having less effect on the ambient temperature of an interior environment.

Higher CRI (Color Rendering Index)

—————> Color Rendering Index is the ability of a light source to reproduce colors in comparison with an ideal or natural light source. With LED lights, colors are more vivid and true.

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PRUF Product Certifications

Product Certifications – ETL and DLC

ETL– Edison Testing Labs



DLC – Design Lights Consortium





Research and Development

Research and Development

Testing Capabilities – Testing Instrumentation

- Spectrophotometer
- Infrared Camera
- Current Probe
- High Voltage Probe
- Passive Probe
- Oscilloscope
- Power Analyzer
- DC Electronic Load
- X-View SSL Test Software
- DC Power Supply
- Temperature and Voltage Logger
- Type J t-couple 2m Long
- Hypot Tester
- Clamp-on Power Meter



Application Analysis

Application Simulation



Conference Room



Hospital Corridor

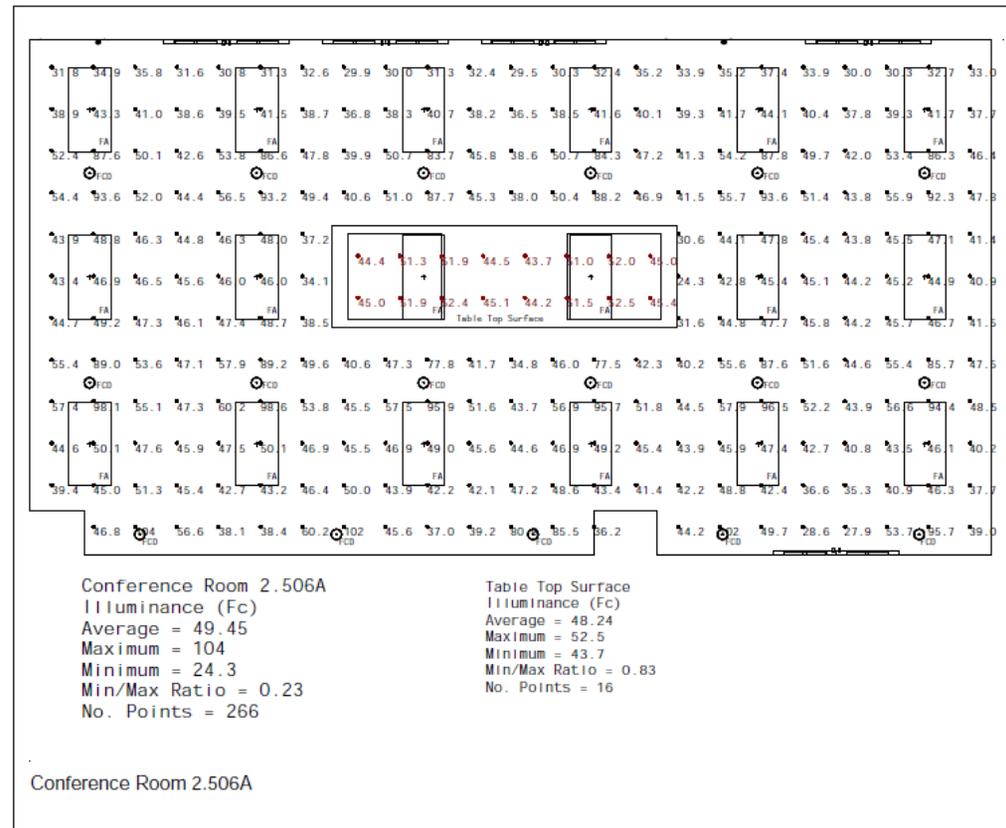
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Application Analysis

Application Simulation





PRUF LED Lighting Projects



Decorative Street Lights



PRUF LED Lighting Projects



Office Retrofit



PRUF LED Lighting Projects

Before

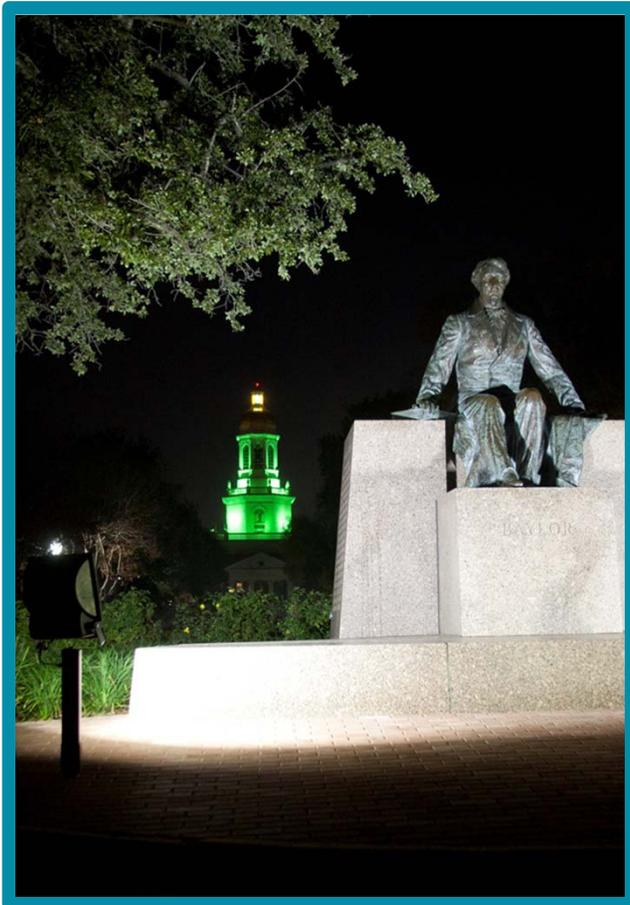
After



UTMB – LED Fixtures



PRUF LED Lighting Projects



Judge Baylor Baylor University



PRUF LED Lighting Projects



Apartment Complex – LED Fixtures



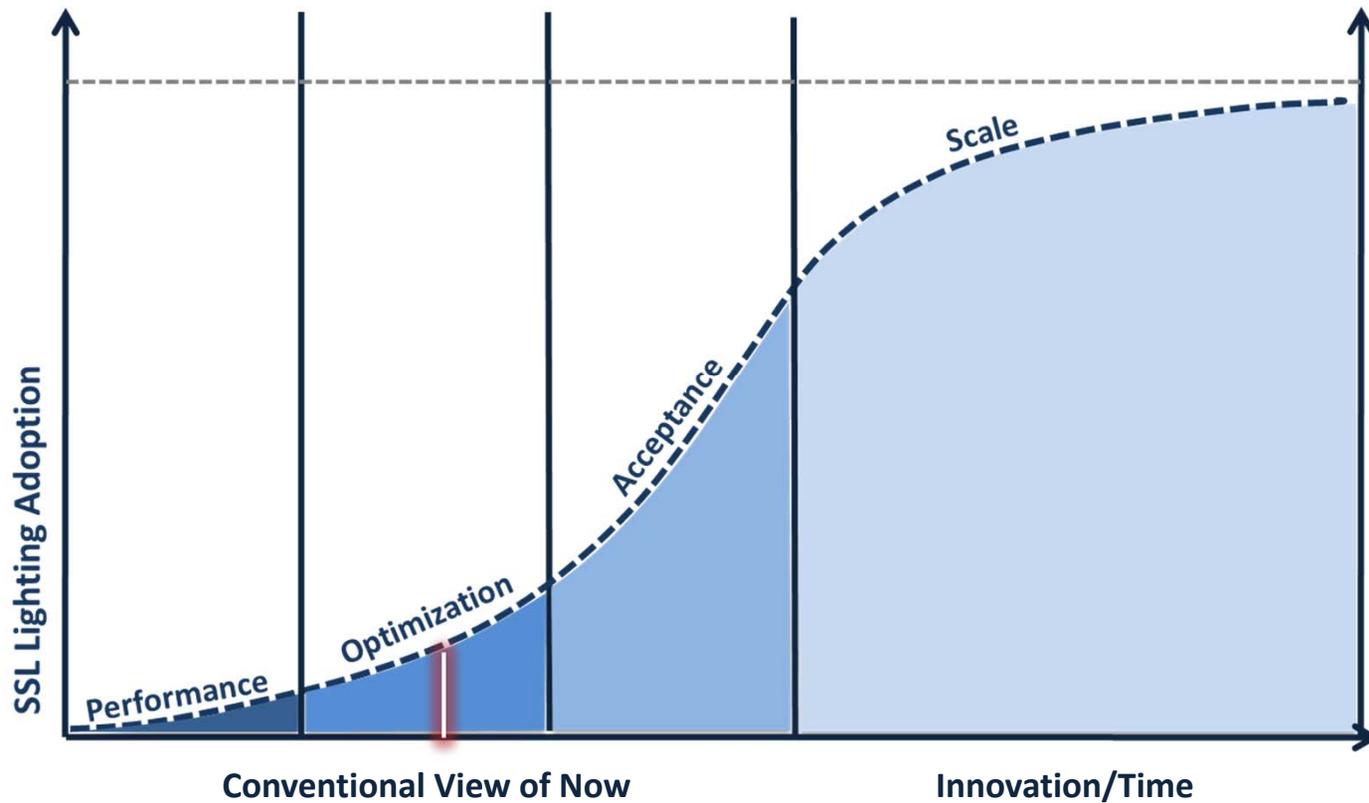
PRUF LED Lighting Projects



Parking Garage Retrofit



PRUF LED Market Analysis





PRUF LED Market Analysis

- Estimated 2011 total revenue for North American commercial and industrial LED lighting. **\$460 Million**
- Percentage of total North American commercial lighting market in 2011. **4%**
- Estimated annual market growth through 2016. **40%**
- Estimated 2013 total revenue for North American commercial and industrial LED lighting. **>\$1 Billion**

**Source: GTM Research*



Frequently Asked Questions

If a light is going to fail, what are the most common causes of failure?

Excessive heat is normally the main factor leading to failure in LED lamps and fixtures. This can cause complete failure or simply reduce the longevity of the lamp or fixture over time. When properly designed, LED lamps and fixtures should last well over 50,000 hours of operation.

If a light is going to fail, will they generally fail quickly after installation?

In some instances, yes. In others, heat or a bad overall design will lead to quicker degradation of the components eventually causing failure.

Are there any warning signs of pending failure?

Significantly reduced light output, strobing, full shut down and then turning back on, and individual diodes failing are all potential signs that the lamp or fixture is facing pending failure.

Do LED Retrofits last as long as new fixtures? Are there certain features and promised benefits on retrofit kits that purchasers should know about before selecting a kit?

Yes, retrofit kits should last as long as a new fixture since they are made with similar design characteristics and components to fixtures and lamps. Proper consultation from the manufacturer is crucial as the placement of the retrofit kit within a fixture or housing can have a substantial effect on the performance and longevity.



Frequently Asked Questions

Do LED bulbs produce as much heat as CFL or Incandescent lamps?

LED lamps emit much less heat than a CFL or incandescent lamp. In many cases, you can actually feel the temperature difference just by being near the light. LED lamps will always operate at a lower temperature than a CFL or incandescent which has immediate benefits in reduced cooling bills in the summer months where we are paying for our air conditioning to cool our offices.

Why are LED lights more expensive?

LED lamps use an actual circuit board to operate and are made of electronic components. Essentially, they could be considered an electronic device. This technology continues to gain advantages almost daily. The manufacturing and supply/demand of general lighting products are gearing up today, and we will see costs continue to decline as the adoption rate of LED Lighting increases.

Is LED light a different type of light?

Yes, LED light is said to be a safer, healthier light. LEDs do NOT produce any sort of ultraviolet radiation which causes fabric fading, color fading in Art, carpeting and other soft goods. There is none of the 'buzzing' or 'flickering' that many people are sensitive to with LED Lights. Residential and especially commercial and industrial plants, stores, libraries, galleries, and warehouses can immediately benefit from LED Lighting.



Frequently Asked Questions

Why LEDs?

As a rule, LED lamps use 90% less electricity than standard lamps. They have an unparalleled even spectrum of light and have a lifespan beyond ten years. LEDs provide us the most efficient way to save energy and conserve our natural resources. If LEDs were implemented right now universally, we would not need to build another power plant. LEDs would actually eliminate the need for over 30 existing power plants!

Do LED light lamps contain mercury?

No. LED lamps do not contain mercury. They can actually be recycled as they do not contain hazardous substances and are manufactured without hazardous substances.

How do LED light lamps compare to CFL lamps?

Studies show LED light lamps use 50% less energy than CFL lamps and in many cases last 10 times longer than CFL light lamps. They are much more durable, environmentally friendly, vibration and shock resistant and offer excellent light quality, both indoor and outdoor.