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California Department of Transportation

Experience with LED Navigation Lights 1999-2001

Background

Cal Trans (California Department of Transportation) has purchased Litebeams cold cathode neon obstruction and navigation lights over the past three decades. These lights have been placed in many adverse environments which include remote towers, bridges, waterways, etc. Cal Trans experience with these lights has been extremely satisfactory. Documented information from Cal Trans pertaining to the purchase of replacement cold cathode lamps for these fixtures reveals Cal Trans experiences an average lamp life of 15-20 years.

Introduction of LED Lighting Fixtures

With the introduction of LED technology, Cal Trans initiated testing the LED lights in consideration for replacing their traffic and navigation lighting with LED lighting fixtures. Discussions yesterday with Mr. Pat McCard, senior supervisor with Cal Trans (Tel. No. 707-763-8557) revealed the results of their test experience. The important facts of this discussion are summarized below:

Lighting Fixtures

There are an increasing number of LED lighting fixtures being marketed. Most models are made overseas and imported to the U.S. There is a wide range of cost and quality. Prices range from \$70.00 to \$700.00 for navigation lights. He did not know the exact cost of the LED models used in traffic signals and estimated them to be ~\$100.00 after rebates from a power company. Prices without rebates average \$250+, wholesale.

The \$70 navigation light fixtures consist of simple plastic cases and lenses. The more expensive models offer extras which include internal photoelectric cells, flashing capability and ability to change colors. The cases may be slightly more substantial than the cheaper models, but are made also of plastic.

Cal Trans had no need for the more expensive navigation lighting fixtures and tested the cheaper models.

The manufacturers told Cal Trans the LED models have an expected operating life of ten years.

LED Degradation in: Light Output

Review of the scientific literature on this subject reveals LED's light output decreases gradually, over time. and depending upon the LED technology, experiences a 12-15% degradation in light output over 4.5-5 yrs. (15,000-20,000 hrs of use).

California Department of Transportation Test Results

- Use in traffic signals has proven successful to date. For a typical intersection, power consumption dropped from 15 amps to 2 amps. Cal Trans has experienced an 85-90% drop in power requirements. It is to be noted that Cal Trans has received significant rebates from PG&E (Pacific Gas & Electric Co.) for purchasing and using these lights.

Upon close questioning Mr. McCard admitted that there have been a small number of failures, both partial and complete. In some instances they have experienced total lamp failure within the first month of use. This is rare, however, and most lights are functioning satisfactorily. He cautioned that Cal Trans has no long term experience to judge the longevity of these lights and they are watching their performance closely. He said that the performance of the LEDs in traffic lights "is a distinct improvement over incandescent lights."

- Use as navigation lights has proven unsatisfactory. The lights do not stand up to the elements. The plastic cases degrade which leads to leakage and light failures. In more than one instance the entire light spontaneously broke in half. When the light begins to fail it flickers, and then the whole "pod" goes out.

Mr. McCard said there are real quality differences between manufacturers and said "some brands just don't last long at all." According to Mr. McCard, the "best models are made overseas." He told us the model made by Tideland® is a good quality light.

There has been a recent FAA approval of an LED obstruction light made by Dialight Corporation. Cal Trans has no experience with this light. In contacting Dialight we determined the current wholesale price for a single obstruction light is \$255.00, and for a dual light \$495.00. In reviewing the literature from Dialight Corporation, these lights are warranted to five years.

Cal Trans is not satisfied with these test results and has decided to continue to purchase the neon navigation and obstruction lights which, in their experience, have a significant longevity, with low maintenance and replacement costs. They will not switch over to the LED light models for navigation and obstruction lights at this time.

Summary

With the combined factors of gradual light degradation, an unknown rate of individual LED and pod failures, deterioration of the plastic case, and a warranty life of five years, it appears cold cathode lighting is superior to current LED technology in these aspects. The cost savings of 85-90% reduction in power requirements for LED lighting as contrasted to a 66% reduction in power requirements for cold cathode lighting, provides an increased savings in power consumption for the LED light.

When viewed in respect to the total cost of the life cycle of lighting for obstruction and navigation lighting, cold cathode lighting as compared to LED technology provides the most cost efficient approach to these tasks.

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