



Above: Shaun Darragh shows the light emitting diodes from Tivoli Lighting that are being used on a pedestrian bridge on the Immunex project in Seattle. LEDs can dramatically cut maintenance costs. Photo by LDL

lighting maintenance.

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practice of organizing labor and resources to ensure consistent recommended light levels and the most economical use of the lighting system. It tunes the lighting system and optimizes performance. In a planned maintenance program, three actions are taken on a periodic basis:

- Group relamping: Replacing all lamps en masse at predetermined basis, usually at 60% - 80% of rated lamp life.
- Fixture cleaning
- Inspection and troubleshooting

Planned maintenance can:

- Reduce nominal labor costs related to fixture relamping and cleaning by up to 70%
- Reduce cost by concentrating lamp purchases into fewer, high-volume buys
- Produce higher light levels over the life of the lighting system
- Generate lighting upgrade opportunities such as reduced-output energy-saving lamps that take advantage of higher light levels to reduce energy costs
- Ensure proper inspection and upkeep of the lighting system, such as ensuring batteries are charged for emergency lighting in compliance with regulations

All lighting systems experience light loss. When designing a lighting system, this light loss must be predicted to the best possible extent and built into the system as a “depreciation cushion.” By doing so, the lighting designer ensures that the lighting system, over a period of time, provides a minimum light level despite the anticipated erosion of output.

Light loss is broken down into recoverable and nonrecoverable light loss factors, which in turn are expressed as light loss factors in lighting design calculations. Light loss factors are values that express the percentage of light reaching the workplane after various characteristics and environmental factors depreciate that amount. A sample light loss factor might be 0.9. During the design process, therefore, if we have a lighting system that produces 100,000 lumens, then only 90,000 lumens will be provided over an established period of time as the causes of light loss take their toll.

Lumens are a measure of the light output of a lamp or lighting system, and footcandles are used to measure light levels at the workplane, or where the light is used. Mean lumens express the amount of light output after deterioration due to light loss factors. Maintained lumens express light levels after deterioration due to light loss factors.

If the light loss factor is “nonrecoverable,” then preventative maintenance generally cannot reduce the extent of the light loss. If the factor is “recoverable,” then preventative maintenance plays a strong role in the extent of the light loss. Recoverable light loss factors include lamp burnouts, lamp lumen depreciation, fixture dirt depreciation and room surface dirt depreciation.

(This is an excerpt from a longer article that is available for download from our website - www.lightingdesignlab.com)

All lighting systems experience deterioration of performance during operation and therefore require ongoing maintenance conducted either by properly trained in-house staff or an outsourced lighting management company. As the useful light distributed by the lighting system decreases, wattage remains the same, resulting in waste.

In many buildings, lighting systems are maintained in a reactive rather than proactive manner. As lamps fail, a service request is registered and the maintenance department can schedule the replacement with its other priorities. Defective components such as failed ballasts and broken lampholders are only replaced when they cause the fixture to malfunction. And fixtures are rarely cleaned, although dirt and dust buildup is absorbing useful light rather than distributing it.

Considering the waste in labor and energy costs involved, it's generally advisable to consider a planned lighting maintenance program during the planning of the lighting system. Planned lighting maintenance is the