

Industrial Lighting for Efficiency and Productivity

Cash incentives from the Efficiency Maine Business Program are just one reason to upgrade the efficiency of the lighting in your industrial facility. Technological advancements and lighting design techniques provide a range of options for lighting in industrial settings. Long-standing lighting methods, such as daylighting, combined with modern technology, can improve productivity, security and safety, quality control and energy efficiency.

Essential Considerations for Lighting Performance

Proper illumination levels for the task – Lighting levels that are too high or too low make production tasks difficult, cause worker fatigue and present dangerous environments.

Object contrast – Even with proper illumination levels, if the contrast is weak, it becomes difficult to perform typical production tasks. Object contrast is particularly critical for quality control functions.

Accurate color rendering – Lighting sources vary in their ability to render colors accurately. When lamps with low color rendering abilities are used, object contrast goes down. In addition, the human vision system works to correct for poor color rendering, which can cause fatigue. The ability to render colors accurately is measured by the Color Rendering Index (CRI) scaled from 1-100, with natural daylight receiving a score of 100.

Lighting uniformity – Moving from very bright to very dim areas is tiring and dangerous. Lighting should be kept reasonably uniform within work areas.

Glare control – Direct glare from lamps and windows and indirect glare from work objects can undermine productivity and create dangerous situations.

Designing for Visual Comfort and Performance

When designing for visual comfort and performance, designers should strive to supply the correct amount of light on the task area, combined with an appropriate level of background illumination. Recommended guidelines for lighting levels have been established by the Illuminating Engineering Society and

are made available by most lighting fixture manufacturers.

Visual comfort considerations also include the color temperature and the color rendering. Differing from the CRI (described above), the Correlated Color Temperature (CCT) relates to the actual appearance of the light with higher numbers (4,000 – 5,500) referring to cooler light, and lower numbers (2,700 – 3,500) referring to warmer light.

Lighting glare is controlled by keeping high brightness lamps and sunlight out of the sightline of the workers. Using larger numbers of low brightness fixtures, indirect lighting, glare controlling baffles and shades are all strategies that help to control workplace glare.

Modern Lighting Technology

Advanced Fluorescent – During the 1970s and '80s, High Intensity Discharge (HID) technologies (mercury vapor, sodium, metal halide) replaced fluorescent lighting as the lighting of choice for industrial facilities. At that time, the advantages of HID technologies were: an increase in light production per fixture (allowing for fewer fixtures and lamps), better working fixtures at cold temperatures, longer lasting lamps, and more light generated per watt.

Fluorescent lighting has recently made a strong comeback. With recent advances in T8 (1" diameter) and T5 (5/8" diameter) lamps and high performance industrial fluorescent fixtures, fluorescent lighting is once again the logical choice for most industrial applications. The light produced is of higher quality than HID lighting providing better color rendering and glare control. Additionally, lighting can be turned on and off as needed, unlike HID lighting which requires warm-up time.

Daylighting – Daylighting is both our most modern and ancient lighting technique. A growing body of evidence tells us what we intuitively know – that daylighting is the best light source for productivity and satisfaction. Modern glazing systems allow for daylighting to be efficiently delivered to industrial spaces. The abilities of daylighting to render colors accurately and to provide object contrast cannot be matched by any artificial light source.

With daylighting, glare and excess heat must be controlled, but proper design and modern glazing materials can successfully deal with both issues. Designers increasingly utilize indirect daylighting, bouncing lighting off of architectural features, shielding workers' eyes from direct sunlight. Modern glazing materials maximize the light gain while minimizing both heat gain and heat loss.

Putting it All Together

Designing modern lighting systems for industrial facilities involves integrating daylighting and electrical lighting in a manner that improves productivity while providing excellent energy efficiency. Both daylighting and advanced fluorescent technologies can reduce lighting electrical loads significantly while boosting production and worker satisfaction.

For More Information

Learn about cash incentives available through the Efficiency Maine Business Program from our Qualified Partners. A complete list of these contractors and suppliers is available at efficiencymaine.com, under Business Program, or call toll-free 866-376-2463. The website, efficiencymaine.com, also provides details about how to apply for cash incentives for electric energy-efficiency projects.