

tips for lighting big spaces.

by Randal Smith



Above: The shipping area and warehouse of a publishing company in Oregon. Glare control, uniformity, vertical luminance, and efficiency are all components of lighting big spaces. Courtesy Greg Hansen LC, Balzhiser & Hubbard Engineers.

Recently, we offered a class called “Lighting for Big Spaces”, and it turned out to be one of our most popular classes in years. It was not a surprise—this is a topic we have always gotten a lot of questions about. There is not anything fundamentally different about lighting big spaces, but some of the qualities of big rooms make designing the lighting trickier than usual.

Big spaces are often thought of as industrial or warehouses, but increasingly they include big box retail, and multipurpose rooms and gymnasiums in schools. Traditionally, these ‘industrial’ spaces have gotten short shrift on lighting quality, but the new big spaces require much more attention be paid to good lighting.

Lighting Issues of special concern

• Glare

High ceilings in big spaces are often illuminated with high brightness fixtures. Excessive brightness makes working and shopping a challenge.

• Uniformity

Improper lighting distribution creates a lot of work for the eye, causing strained, tired eyes.

• Vertical brightness

People assess the brightness of spaces through the amount of light on ceilings and walls. Dark vertical surfaces make big spaces seem like uninviting caves.

• Maintenance Costs

Many big spaces operate 24/7 and have very high ceilings. Long burn hours make

for more frequent relamping. High ceilings mean that costly lifts are needed to change the lights. Every trip up the lift may cost more than the lamps and energy. Lighting maintenance that is deferred makes the space look neglected and ‘broken’.

• Energy Efficiency

The intensity of light decreases as a function of the square of the distance. This means that a light that is mounted twice as high is one-fourth as bright. So lights mounted high in big spaces must produce lots of lumens to make the space feel well lit. To produce those lumens, it is advisable to use light sources with high lumens/W ratings. Big spaces are regulated by energy

codes too, increasing the challenge of lighting them effectively.

Lighting Options For Big Spaces

• More diffuse lighting

Using luminaires that are more diffused than just point sources can help reduce unpleasant glare in big spaces. This means that when practical, fluorescent luminaires might be selected instead of HID as a tool for reducing glare.

• Uniformity

Pay close attention to the manufacturer’s spacing to mounting criteria of each luminaire. Properly spaced luminaires can evenly light spaces, reducing the amount of work the eye has to do to adjust. High contrast ratios may be nice for displays, but do not help much for working, general shopping, and schools.

• Distribution and reflectivity

Luminaires may be placed so that more light is on walls and warehouse stacks. Fixtures can be selected to provide some uplight. But the surfaces need to have lighter color values in order to reflect the light in the space. Sometimes the ‘lighting’ solutions lie in painting, not relamping.

• Lamp Life and Lumen Depreciation

More light sources are on the market with longer life ratings. Many fluorescent and HID sources last longer than 20,000 hours, especially on longer burn cycles. Induction light sources can operate for an entire working career—100,000 hours. Lamp lumen depreciation, which used to be 30% or more now can be less than 10%. Longer life and less depreciation mean that you get lots more light over the product life.

• Energy Efficiency

Many energy codes allow a Watt or less per square foot in big spaces. So a ceiling filled with 1000W luminaires does not always comply anymore. New pulse start metal halide lamping options improve efficiency for HID. T5HO and T8 fluorescent lamps have revolutionized lighting and efficiency for low-bay applications. When good lighting distribution provides better uniformity, the eye does not need high footcandle levels to see well.

Daylight is a huge tool for improving the efficiency of lighting in big spaces. Skylights and clerestories bring in light during daylight hours. Daylight improves the color, aids in productivity, and integrates well with controls for effective load shedding.

Visual acuity is important nearly everywhere, especially in big spaces where working and shopping happen. Improving visual acuity comes from better lighting distribution and better color. Major advances in color from light sources have improved the lighting in big spaces across the board.

Lighting for Better Color in Big Spaces

• Ceramic Metal Halide

Once CMH was limited exclusively to lower wattage lamps, but this is changing. Higher wattage lamps needed for bigger spaces are becoming available. The CMH lamps offer Color Rendering Index ratings in the ‘80s, transforming dreary warehouses and retail spaces into vibrant, interesting spaces.

• Rare Earth Fluorescent

The old halophosphor days of the Cool White and Warm White lamps are gone, largely done in by the Energy Policy Act of 1992. Today’s Rare Earth (RE) phosphors have ushered in more efficient fluorescent lamps with tremendously better color.

Standard T8s offer CRIs in the ‘70s, but the ‘80 series lamps provide both better color and more lumens. All T5 and T5HO lamps offer CRIs in the ‘80s and high lumens per Watt. Most energy efficient sources offer better color while improving efficiency.

Today’s lighting technology, when combined with intelligent and sensitive design practices mean that our big boxes no longer have to be bland boxes.