Choosing the Right Photocontrol System for a Warehouse

Timberland, a boot and outdoor clothing manufacturing company from New Hampshire, decided to open a west coast distribution center in California. They leased three-fourths of a 400,000-square-foot skylit warehouse from Industrial Development International near the Ontario Airport. Their improvements to the building called for a mezzanine to be added for an upper work area and areas of narrow racking to be installed from floor to ceiling.

Photocontrols were included in the tenant improvements, but on this fast track project, the control circuitry was designed before Timberland’s racking layout was finalized. As a result, some of narrow racks aisles were under the control of a photosensor responding to more open conditions, leaving some of the aisles very dark.

Once they moved in, Timberland found it necessary to re-wire the control circuits. A re-wiring plan grouped homogeneous conditions together into five large zones: 1) open processing area, 2) under the mezzanine, 3) above the mezzanine, 4) wide racks, and 5) narrow racks. (See diagram at left.)

Lighting Conditions Can Vary with the Production Season

The 4x8 bubble skylights are evenly distributed over the roof on a modified 30’ x 30’ grid. The result is that two out of every three narrow rack aisles have skylighting directly overhead. When stocks are low, the open metal frame racks allow the daylight to penetrate between aisles. However, during the busiest times of the year, boxes are stored all the way up the 30’ racks, to within a few feet of the 35’ high ceiling, blocking almost all of the light from the skylights. During those periods, regardless of the daylight available from the skylights, one-third of the aisles will always be darker, and will need more illu-
mination from electric lights than their neighbors.

This situation emphasizes that logical lighting control zones should be based on the actual use of the space and the presence of partitions, mezzanines, shelving, and/or equipment. Thus, the layout of the photocontrol circuits should usually be one of the last tasks of planning a building, after all other space planning decisions have been finalized.

Re-evaluating the Electric Lighting

The lighting system at Timberland uses a combination of 250-Watt and 400-Watt metal halide high-bay and low-bay fixtures. It varies in lighting power density from a low of 0.5 Watts per square foot (W/sf) in the open areas, to 1.8 W/sf in the narrow stacks where the fixtures are on a 10’ x 15’ grid. Overall, the lighting power density of the warehouse portion of the building is 1.2 W/sf.

However, after occupying the building for a short time, Timberland management has also re-evaluated some of their lighting requirements. Even underneath the mezzanine without skylighting, the management finds that they can often operate the area with only half of the lights on, at 10 to 15 footcandles. Similarly, Timberland occasionally operates the building during night shifts with only half of the lights on.

Well-Vented, But Dust-Free Warehouse Operation

Many unconditioned warehouse buildings have employed self-venting skylight units to facilitate ventilation. This system, however, has a number of disadvantages. Wind-driven rain can be blown into the building, and the uncontrolled ventilation increases the amount of dust that enters the building. As an alternative approach, the developer combined unvented skylights with switched roof-top ventilation fans in this building, along with weather seals at the loading docks. Even though the facility is unconditioned, the building engineer has found that he can easily keep the interior more comfortable through strategic operation of the fans. During the summer, he turns on the vents during the night and early morning hours to flush the building with cool air. He then turns the fans off during the hottest part of the day. The concrete walls and floor of the building retain the nighttime coolness, and keep the interior of the building more comfortable for the workers.