



Putting Your Facility in the Best Light: Part 3 - Pulse-Start, Drop-Lens Canopy Lighting

The trend in canopy lighting is to provide high levels of white light while using less electrical energy. Jim Wang explains why HID lights are among the most efficient lights available today to accomplish this.

Lighting technology update:



Optical assembly in Hubbell's new high intensity discharge lighting fixture (the UCL) designed for petroleum canopies, as it looks when installed (below canopy).

Consolidations within the petroleum industry are causing changes on the gas station side of the business. Re-imaging, modernization, convenience store stations, fast food alliances and super station trends are prompting lighting companies to develop new products to meet the new demands of the industry.

To meet these needs, the trend in canopy lighting is to provide high levels of white light with less energy. High intensity discharge (HID) lights are among the most efficient lights available today that meet this need. HID lights are used mainly for high-wattage industrial, commercial and street lighting.

High intensity discharge technology

HID technology consists of special lamp and ballast combinations. The proliferation of higher levels of white light (metal halide) can be readily seen in the parking lots of major retailers, malls and new or upgraded petroleum station canopies. Some of the benefits of higher light levels are:

- A safer, anti-crime environment
- An eye catching, cleaner look
- Improved true-color display
- Lower energy and maintenance costs

Two major lighting components that help achieve these benefits were recently introduced. First is the pulse start, metal halide lamp and ballast (Super CWA: Constant Wattage Autotransformer). Second is the sag or drop lens used in the fixture.

Pulse start technology

Pulse Start technology is a relatively new, metal halide system that is growing in popularity and

availability. It is mainly a vertically oriented lamp system with a ballast, igniter and capacitor. By incorporating an igniter into the circuitry, lamp designers eliminated the starting electrode and optimized the arc tube (the light producing element) design and chemistry. Ballast designers were able to produce a more efficient, cooler running ballast with less energy losses. Some of the main benefits of pulse start technology over the old CWA metal halide technology are:

- Quicker start/restart time (2- versus 4-minute start and 4- versus 15-minute restart)
- Longer life (15,000-20,000+ hours; up to 50 percent better lamp life)
- Improved lumen maintenance (up to 20 percent more light output over the life of the lamp)
- Increased efficacy (22 - 32 percent more efficient: up to 110 lumens per watt)

To design more efficient lighting fixtures, an important principle has to be applied: expose as much of the lamp as possible. A 100 percent efficient fixture consists of a socket and bare lamp. However, the true goal of efficiency is not to achieve a "high efficiency number," but is to effectively place the light on surfaces that you want lit. A high efficiency fixture is, in reality, an inefficient product if a large percentage of the light is not projected onto the surfaces desired. The quality of light is also an important aspect of good fixture design. The light should be as "smooth" as possible, with no "bright" or "dark" sections within the targeted area (maximum-to-minimum ratio).

The Hubbell pre-wired ballast unit has die-cast aluminum housing, hinged lid, built-in handles and pre-tapped conduit holes



One of the internal reflectors in the Hubbell optical assembly is being adjusted to reflect the light downward

There are numerous ways to direct and control light. The most common are with the use of reflectors, lamp designs (technologies and designs) and lenses (prisms, textures, colors, and materials). All of these design elements have their pluses and minuses and it is up to the engineer to maximize the pluses while minimizing the minuses.

Dropped lens technology

Hubbell Lightning's new HID canopy lighting fixture, the UCL (Under Canopy Luminaire), was designed specifically for petroleum canopies. To produce a high efficiency fixture, a "dropped lens" concept was adopted to produce a high output product with attention-getting sparkle. With a dropped lens design, a large portion of the lamp extends down into the lens area to allow the light to illuminate directly out of the fixture.

A "prismatic" lens was designed to bend high angle light downward to increase the light levels on the pumps and pavement. A certain amount of upward "spill light" was designed into the system to light the underside of the canopy to eliminate the "cave effect." Although drop lens designs are very efficient systems that project large amounts of light, the down side is glare, because the bright arc

tube is visible at far distances.

Glare is not always undesirable. In fact, glare is presently in high demand in the petroleum industry because high levels of "customer-attracting" light produce a clean, safe environment. However, as more and more gas stations upgrade their lighting systems to drop lens designs, the amount of light being produced in multiple gas station areas is overwhelming. As a result, some cities are beginning to legislate against this type of fixture.

Addressing glare

To address the glare problem, the UCL was developed with a number of innovative features that can be adapted to meet customer needs:

- Two internal reflectors were designed to reflect the light downward at lower angles (semi-cutoff).
- The internal reflectors have an adjusting mechanism that allows them to be rotated to reduce high angle light and redirect that light downward.
- Optional snap-on shield/reflectors can be added to the internal reflector system to produce eight different shielding and distribution solutions (cutoff).
- The optical assembly can be replaced easily from below the canopy to produce a completely different design.

Installation and maintenance

In developing the UCL, Hubbell evaluated performance, inventory, warehousing, installation and maintenance issues. Extensive market research, customer feedback and technology investigations resulted in developing a modular lighting concept with foolproof hinging, latching, gasketing and installation features. Self-centering hinges, spring-loaded latching and a removable, hinged electrical door provide excellent fit and finish, water and bug proof sealing, on-ground relamping with no special tools and easy installation.

The UCL has a die-cast aluminum ballast housing with a removable, hinged electrical door (tool-free). The ballast unit is pre-wired and packaged separately for installation convenience (installed on top of canopy) and modularity purposes (mix and match to produce different products).

The optical assembly is also packaged separately (installed below the canopy) and consists of a die-cast, powder-painted, aluminum refractor frame and mounting plate and a prismatic refractor. The borosilicate glass refractor is mounted into the refractor frame with a continuous, extruded silicon gasket. The refractor frame is attached to the mounting plate with self-centering hinges and an automatic, positive lock, extruded aluminum latching system. The latching system allows relamping from the ground with a standard re-lamping pole. Simply push up on the latch, lower the door, change the lamp and close the door.

The pre-wired ballast unit is installed on top of the canopy. The optical assembly is attached from below onto two ballast unit bolts that extend through the canopy. The ballast unit and optical

assembly are equipped with large silicon foam gaskets that seal the installation holes in the canopy from above and below. This insures that the canopy holes are completely protected and will not rust.

Optional support rails that fit under the ballast unit are available to eliminate sag for weak or old canopies. These rails are also used to install the UCL in double or "roofed" canopies. By supporting the ballast unit on rails over a large hole, the UCL can be easily installed and maintained from below the canopy.

The standard UCL fixture can be retrofitted on existing canopies. The fixtures are used with a modular "UCT" (Under Canopy Trim) trim system that is designed to fit various 2-foot by 2-foot surface mounted fixtures, recessed rectangular fixtures, and custom surface and arm mounted housing trims. In addition to the inventory benefits of a modular system, if the canopy is ever replaced after a retrofit installation, the standard UCL fixtures can be re-used on the new canopy.



Lamp in the Hubbell optical assembly being changed from the ground. The tool used to change the lamp is also used to open and close the hinged lid (lens)

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