

DDP Revamps Aisle Lighting in the Cerritos Performing Art Center

By Tony Toniolo, President, DDP



Location

The Cerritos Center for the Performing Arts (CCPA) is the Southland's premier performing arts and conference facility, offering great performances in music, dance and theater

and unique facilities for meetings, banquets and special events. Strategically located in the Los Angeles, California basin, the CCPA took the performing arts world by storm in 1993 with the opening of the world's most innovative theater. Known as the "City of Dairy Valley" from 1956 to 1967 and home to the world's largest auto mall, few suspected that the City of Cerritos would be responsible for producing a theater of international acclaim. The CCPA has become the city's icon and for the past three seasons, has been ranked among the top theaters in the nation.

Inside the 6,000-square-foot auditorium are the basic elements required for a theater: a stage, floor, ceiling and seats. But this is where any similarities to other theaters end. The CCPA is a designer's dream, where all the pieces can be rearranged to create a number of different configurations. While balcony seating remains fixed, floor seating is adjustable on wagons with air casters, enabling them to be raised, lowered or even removed. The stage can be transformed into various sizes either manually or by electronic controls. The towers, which hold the CCPA's distinctive box seating, are also equipped with air casters and can be angled to face the stage in any one of a number of positions. One of these towers is the 300,000-pound rear tower, which holds the boxes located behind the stage. This massive seating tower can be pushed out for In-the-Round and Concert seating or hidden behind the stage.

One may think that rearranging the theater would take weeks. Surprisingly, as massive as these pieces are, the Cerritos team is able to move from one seating configuration to another in eight hours or less.

The six basic configurations (arena, concert, lyric, cabaret, recital and sierra cabaret), enable the CCPA to provide the ideal theater setting, audience sight lines, and sound quality for each performance. This offers audiences a new experience with every visit.

Scenario

To help reduce its power consumption and maintenance costs, the CCPA wanted to replace the incandescent lights in many of the lower light output fixtures with LEDs. These lighting fixtures provide aisle and seat illumination for patrons of the CCPA during the performance. There were three types of fixtures that needed to be retrofitted and replaced with LEDs.

1.) Operating at 24 VAC, the seat mounted aisle lights utilized an S6-style incandescent bulb encased in a metal housing that featured a shroud over it to reflect the incandescent light downward, thus illuminating the aisle. Mounted to the side of a chair, the incandescent bulb significantly heated the metal shroud to the point that it was hot-to-the-touch.

These aisle lights regularly failed due to the shock, vibration and on/off cycling. The lights operated continuously all day long, from the time someone entered the theater until the last person left, typically for around eight hours a day. On performance days/nights, the lights were on for around 20 hours, from 6:00 a.m. until 2:00 a.m. Due to the amount of use and the rugged environment, the incandescent bulbs needed to be changed an average of four times a month.

2.) Tivoli lights, located under seat armrests, were housed in a square tube that featured six incandescent lights, similar to Christmas lights that lit up the row and seat numbers for patrons of the theatre. These lights also operated continuously all day long for about eight hours a day and 20 hours on days of a performance. The Tivoli lights featured a short life cycle of around two months, and in many cases, multiple tubes were placed under an armrest so that when one burned out, it didn't need to be immediately replaced.

3.) Clamshell fixtures mounted to the walls illuminated the aisle and steps from two feet above the floor. Operating at 25 watts, the 120 VAC incandescent bulb provided a wash effect to provide low-level lighting for the pathway. The clamshell fixtures burnt out every two months due to the same extended operating time.

Challenges

CCPA faced many challenges in converting to LED lighting. The first of which was finding a company that specialized in retrofitting and replacing incandescent lights with high-quality LED solutions. The LED engineering firm needed the expertise to develop rugged LED assemblies, as seats would be moved on a



Inside the 6,000-square-foot Cerritos Center for the Performing Arts (CCPA), the Southland's premier performing arts and conference facility.



Tivoli lights are placed under seat armrests to help illuminate row letters.



Clamshell fixtures are mounted to the walls illuminated the aisle and steps.

regular basis in order to adjust to performance requirements.

As three different types of fixtures needed to be outfitted with LEDs, three different solutions were required. A prerequisite for all three LED assembly solutions was that they had to fit into the existing housings and work appropriately and safely within the existing architecture. Each fixture presented additional challenges for the lighting designers and engineers including custom engineered PC boards, odd light bulb installation angles, viewing angle requirements, thermal considerations and ruggedness.

Solutions

CCPA and its lighting specialist selected DDP to engineer the LED assembly solutions. DDP, located in El Segundo, Calif. specializes in developing high-quality, ultra-reliable LED lamps for its customers and provides services that include engineering, innovative designs, LED prototypes, test and evaluation, and tailored LED solutions for specific indication and illumination applications. After careful evaluation of the project, DDP developed three custom solutions for CCPA.

1.) The original incandescent seat mounted aisle lights featured a unique 45° viewing angle to light down onto the aisle. Rather than manufacture a S6 style retrofit light to reflect of the shroud like the incandescent design, DDP decided it would be more efficient to develop a custom PC board with warm white (color temperature of 2,800 K) LED emitters mounted at a 65° angle to light up the aisle. This custom solution used three LEDs operating at 20 milliamps (60 percent lower than the S6 incandescent bulb) providing 11 lumens of diffused warm white light. The rugged electronic design ensures that the vibration and shock caused from rearranging the venue's seating configuration would not damage the LED assembly. The LED design also solves the issue of the hot metal housing, as LEDs operate at a much cooler temperature, ensuring the safety of every visitor.

2.) DDP replaced the 24 VAC Tivoli lights under the armrest with six warm white, surface-mount LEDs and a custom PC board and acrylic housing that was designed to fit into the exact same shaped and sized housing as the incandescent. The surface-mount LEDs provide 15 lumens of light and only operates at 25 milliamps. "We selected surface mount LEDs with a lambertian optic because they provided the ideal viewing angle for this application," said Tony Toniolo, DDP president. "These LED assemblies significantly reduced the power consumption and the maintenance cost, as the assemblies have a life cycle of around 50,000 hours - unaffected by shock, vibration, and on/off cycling."

3.) DDP replaced the 25 watt 120 VAC clamshell lights with a light engine that included 10 warm white high-flux LEDs mounted on a custom PCB with an Edison style lamp base connector. The new assembly operates at 30 milliamps and provides 60 lumens of light. "We overcame the difficult mounting angle by developing a custom PC board and attaching an Edison E27 screwbase to plug into the back of board. This design directed light where it was needed to work with the existing fixture, lens and reflector," said Toniolo. "The clam shell housing was designed to refract light emitted 360 degrees from an incandescent bulb and direct it out of the bottom of the fixture while shielding glare from the top of the fixture. Our LED solution is a much more efficient use of light and energy in that none of the light produced is wasted inside the housing."

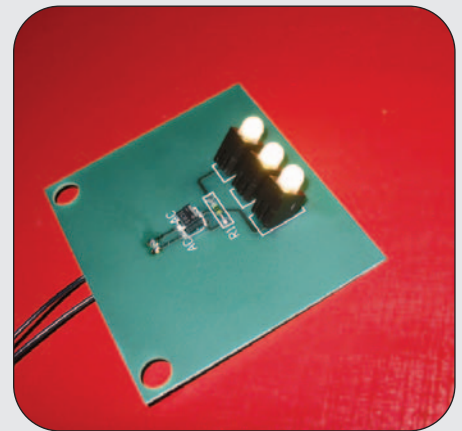
"Working with DDP's advanced team of LED design engineers made our transition to LED technology very easy and smooth. DDP's vast expertise in retrofitting and replacing incandescent lights with new LED assemblies allowed them to provide custom solutions that met our needs in the time-frame that we required," said David Thibodeau, lighting specialist for the Cerritos Center for the Performing Arts. "We look forward to working with DDP again on additional LED retrofitting projects in the future."

Conclusion

The Cerritos Center for the Performing Arts is an exceptionally beautiful performing arts and conference facility that underwent lighting renovations to reduce its power consumption and maintenance costs. The energy-efficient LED solutions provided by DDP combined a stylish look with a rugged and high-performance design to increase the efficiency of the lighting. Featuring significantly lower operating voltages and considerably higher operating life expectancies of around 50,000 hours, DDP's three custom engineered LED solutions met the requirements of the CCPA. As LED technology continues to improve, DDP will continue to develop higher-output LED retrofits for CCPA's higher-lumen light sources.



Seat mounted lights illuminate the aisle for CCPA patrons.



Custom PC board with warm white (color temperature of 2,800 K) LED emitters mounted at a 65° angle to light up the aisle.



DDP replaced the 24 VAC Tivoli lights under the armrest with six warm white, surface-mount LEDs and a custom PC board and acrylic housing.

Tony Toniolo is the president of DDP. He has been with DDP for more than 15 years, starting in 1989 as the director of Sales and Marketing. Tony received a MBA from Pepperdine University and has a B.S. in Business Administration. He can be reached at tony@datadisplay.com.