

Case Study: Light-Art Concert

Classical Concert Plays a Symphony of LED Color Conducted by Future Lighting Solutions Partners

Color-changing balloons lit from within by custom-built RGB LUXEON® LED modules for a special concert in Germany, with a mirror behind the orchestra reflecting the light show



December 19, 2008, was a red-letter day – and purple, pink, blue, green and gold, too - in the annals of symphony performance. On that date, the Jena Philharmonic Orchestra in Jena, Germany, performed works by composers Alexander Scriabin, Igor Stravinsky and Georg Friedrich Haas in a concert hall filled with 170 weather balloons that changed color to complement and enhance the music. The historic LED-driven light-art concert was the culmination of a joint development effort between an artist and members of the Future Lighting Solutions network, fulfilling Scriabin's 20th century vision of marrying color to music by utilizing never-before-possible 21st century solid-state lighting.



Up to four hexagonal 18-LED modules were attached to aluminum tubes inserted into each balloon

UP, UP AND AWAY

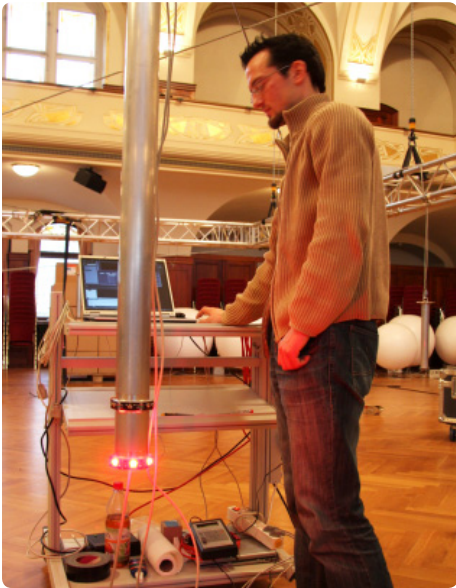
The unusual light/music event was inspired by Scriabin's 1910 'Prometheus: Poem of Fire' symphony, written for orchestra, piano, voice and a piano-like 'color organ' designed to project colored light onto an on-stage screen. Some musicologists believed, however, that Scriabin's original intention was to flood the entire concert hall with color and that he abandoned the idea when it proved to be technically unfeasible.

Nearly a century later, technology-savvy music fans recognized an opportunity to revisit Scriabin's color concept with power LEDs. With that in mind, Stuttgart artist Rosalie was commissioned to create a color-changing installation to accompany the 'Prometheus' symphony as well as Stravinsky's 'Firebird' and



“One of the reasons we are a Future Lighting Solutions partner is their ability to assist in building complete LED solutions. From providing binning tools and services to matching us with a board designer, they played an important part in what is arguably the most exciting project using our JENCOLOR color sensors to date.”

Dr. Fred Grunert, Managing Director, MAZeT GmbH



Testing LED modules in the concert hall before inserting the tube into a balloon



A rainbow of colors pre-programmed to change with the music, using special controls to ensure color consistency

a piano sonata by contemporary Austrian composer Haas. The project was dubbed ‘LUCE: The Sound of Color’ after the Italian word for light as well as the ‘Luce’ color organ itself.

The artist’s plan called for hanging 170 translucent latex-based weather balloons in eight different sizes above the audience, on the balustrades and between the aisles at the Volkshaus Jena concert hall. RGB LED modules inside each balloon would change color on a pre-programmed schedule paralleling the mood and tempo of the music. The balloons and color changes would also be reflected on a mirror behind the orchestra, amplifying the effects of the installation.

Color sensor developer MAZeT GmbH and manufacturer JENOPTIK AG signed on as the main sponsors of the performance, with assistance from German LED solutions provider MAL Effekt Technik and LED distributor/solutions support service Future Lighting Solutions to build the LED portion of the installation. Working together, the team delivered a complete solution matched to the artist’s specifications, including a closed-loop color and brightness management system that was essential to achieving color consistency from balloon to balloon.

TUNING INTO COLOR

The core color-changing capabilities were provided by custom-built RGB LED modules designed and manufactured by MAL Effekt, a Future Lighting Solutions Integration Network Member that Future recommended to fellow member MAZeT after learning of MAZeT’s involvement with the project.

Each module consisted of 18 red, green and blue LUXEON® Rebel LEDs from Philips Lumileds mounted on six metal-core PCBs with three LEDs per board. The PCBs in turn were affixed to six-sided metal submounts screwed into aluminum tubes inserted into each balloon. The balloons were outfitted with one to four LED modules, depending on balloon size, enabling each orb to





Color-calibrating the balloons via the DMX 512 controller and a custom MAZeT electronic before installation at the concert hall

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be lit from within by 18 to 72 LEDs. A MAL Effekt-developed DMX512 Power module was used to drive the LEDs, generate the desired colors, and control both color point and brightness via pulse width modulation (PWM).

Several steps were taken to assure color consistency in the LEDs themselves. First, MAL Effekt used proprietary Future tools to calculate the achievable chromaticity coordinates and thereby determine which color bins were required to produce the color values specified by the artist. Second, the firm took advantage of Future's binning program to ensure that every balloon would be illuminated by LEDs from the same bin of each color in Future's managed inventory.

For additional uniformity assurance, each balloon was also fitted with a JENCOLOR color sensor developed by MAZeT and manufactured by JENOPTIK. The sensors monitored the color produced by the RGB modules and sent the information from a central DMX512 control panel to a custom MAZeT electronic for any necessary adjustments to ensure the homogeneity of color tones from balloon to balloon.

ART + TECHNOLOGY

For the concertgoers who attended any of the three 'LUCE' performances in the two-story Great Hall of the 105-year-old Volkshaus building, the combination of the balloon-filled room and the constant color play made possible by the various LED components and controls produced a symphonic feast for both the ears and the eyes.

Part concert, part art work and part light show, the series presented a unique fusion of artistic genres driven by invisible LED technology. It also showcased the roles of multiple players in the LED application value chain. Future Lighting Solutions brought together a complete team to solve the various lighting challenges involved in the project, from illuminating the balloons to changing colors and maintaining color consistency.

In the process, the project showed what can be achieved by combining the power of the imagination with the power of modern lighting technology. Whether or not there is ever a repeat performance of the groundbreaking light-art concert in Jena, one thing is certain: LEDs have given artists, designers and engineers a whole new lighting canvas to work with. Alexander Scriabin would be pleased.

