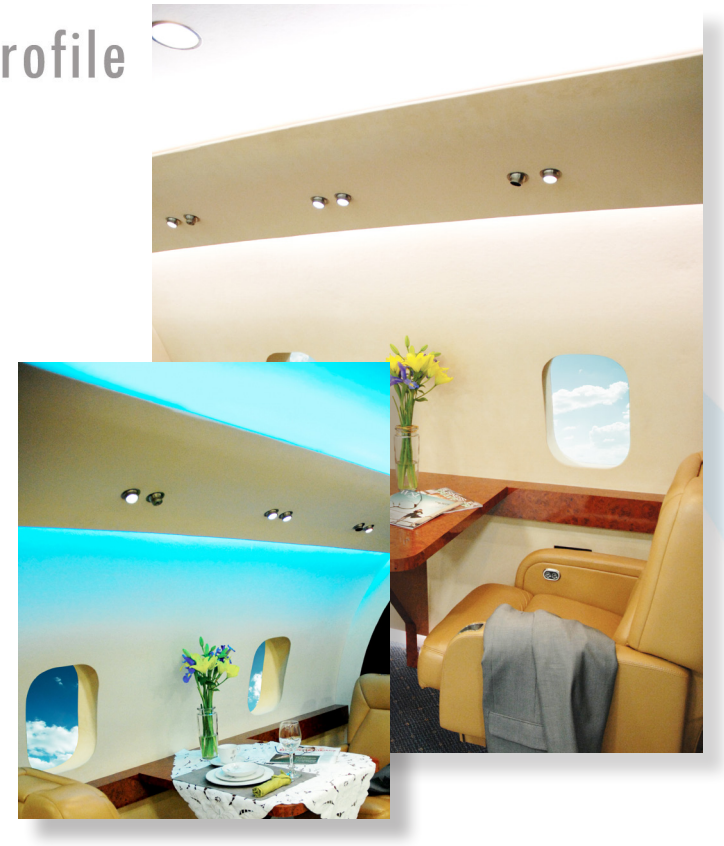
NORLUX Project Profile

Full Spectrum Interior Linear Aircraft Lighting



Objective:

- To develop a full spectrum lighting system (16 million different colors) for interior aircraft with high color quality and consistency, which also accommodates any shade of white light by efficiently blending multiple wavelength LEDs without exposing the individual colors in application.

• Capabilities/Service Provided:

- Electrical and Mechanical Design Services
- Software Development
- Thermal Management
- Color Management Theory
- Optical Strategy
- Chip-On-Board Manufacturing
- Turn-key Manufacturing
- Programming, Calibration and Testing

• Scope of Work:

- Power directly off 28VDC nominal aircraft power
- Optional 32 preset lighting modes
- High color rendering
- 100% fully dimmable
- Maintain color consistency from module-to-module and lot-to-lot
- Maintain color consistency over lifetime of product
- Eliminate streaking or color reflections by mixing colored LEDs within the light
- Sunrise-to-Sunset mode capability with cabin management system integration
- Multiple lengths in 3” increments to accommodate any length application
- 1” square profile housing for easy concealment
- Interconnectivity to link 125’ of lighting

Challenges:

Module-to-module color consistency

- Problem – Due to the wide variances seen within LED characteristics (forward voltage, intensity, and wavelength) from batch to batch of LEDs, each 3” light engine could look considerably different.
- Solution – Norlux developed a white point calibration system to preset each light engine to the same chromaticity point. The unique calibration coefficients are stored into each light engine to achieve a system wide consistency within 2 macadam ellipses.
- Problem – Due to temperature variances within an aircraft and the sensitivity of LEDs to temperature changes, areas of the linear light system can show visible color differences (i.e. near air vents).
- Solution – Norlux developed onboard thermal feedback with corresponding algorithms to compensate for thermal effects on the LEDs. The system automatically adjusts to maintain both color and brightness.

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Color consistency over lifetime of product:

- Problem – Due to the fact that different wavelength LEDs age and degrade at different rates, preset colors and color temperatures will shift over time.
- Solution – Norlux developed onboard optical feedback with corresponding algorithms to compensate for LED degradation over time.

Color and Optical Considerations:

- RGB systems inherently have poor white light color quality. Amber was added to the RGB system to boost CRI above 80.
- A highly engineered, custom designed lens was required to achieve full color mixing within 1-inch of the fixture surface.

Result:

- This linear aircraft lighting system combines the latest LED technology and controls into an amazingly versatile product. The precise color consistency and dimming capabilities woven together with all the benefits of LEDs (lightweight, energy efficient, long life, etc.), creates a system that far surpasses any other lighting technology available. This seamless integration of such high tech lighting into an aircraft provides an environment that will impress even the most discerning traveler.

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QUASAR® Lighting System

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