Optical Solution for U.S. Type 3 Medium Streetlight

Introduction

In the U.S., one of the most popular IESNA type designations for streetlights is the Type 3 Medium. To date, however, no off-the-shelf optical solutions exist. An optic based on the **OSLON** SSL LED was designed, prototyped, and measured to demonstrate the feasibility of producing this type of beam pattern.

Design Requirements

The design requirements were as follows:

- Produce a Type 3 medium beam pattern
- Achieve high optical efficiency
- Create a design concept that can easily be extended to create a full streetlight.

A single optic was designed for use with an OSLON LED (LCW CP7P). Acrylic (PMAA) was chosen for the optic material; however, other optical-grade plastics could be used. The final optical design produced a Type 3 Medium beam pattern with 87% optical efficiency.

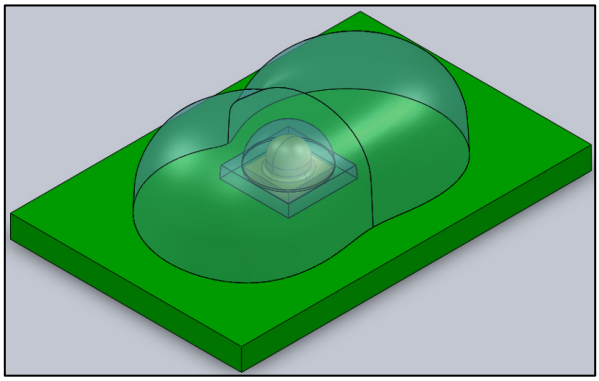

Figure 1. Design including lens, LED, and PCB.

Prototype

A prototype lens was produced by machining and polishing a piece of acrylic. A warm white OSLON (LCW CP7P) was used for the prototype based on availability. While there are small differences between the light distributions of the LUW and LCW parts, these differences are not great enough to affect the optical efficiency or the IESNA type designation. The LED was soldered onto a PCB made of FR4 with thermal vias. The lens was then placed over the LED and glued onto the PCB. The luminous flux of the LED was measured before adding the lens.

Figure 2. Prototype lens mounted on PCB.

The PCB was mounted onto a heatsink. The light distribution of the assembly was then measured on a goniometer. The LED was driven at 350 mA constant current, and thermal equilibrium was reached after 15 minutes. Finally, an IES file was created from the goniometer measurements.

Results

A comparison of measurement and simulation are shown in **Figures 3 & 4**. The correlation between measurement and design is quite good. The optical efficiency was 86% and, most importantly, a Type 3 Medium pattern was produced.

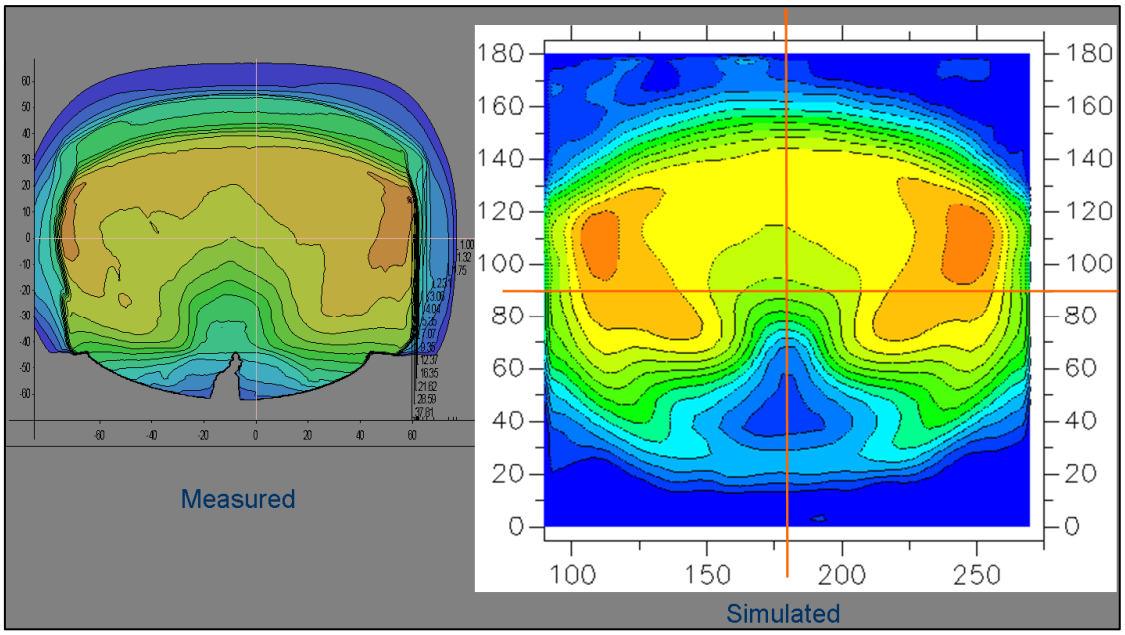

Figure 3. Compare isocandela plots of measurement and simulation.

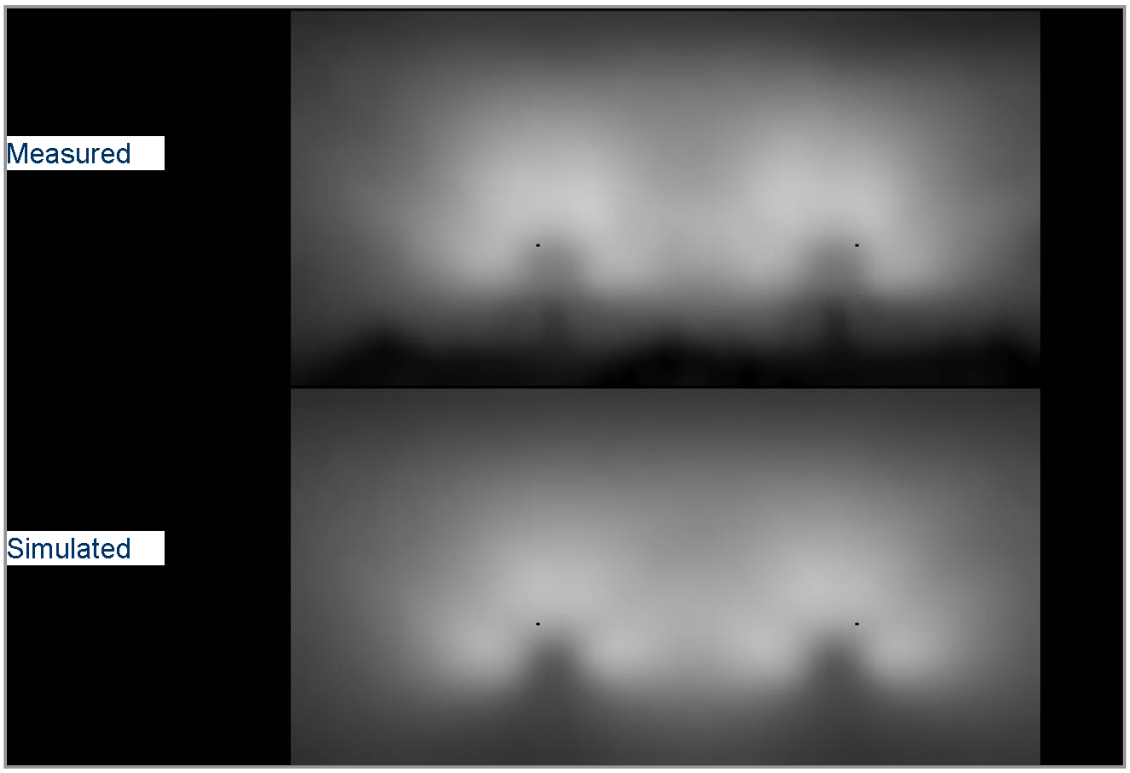

Figure 4. Grayscale luminance plots comparing measured and simulated beams.

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Conclusions

The optic which was designed and built proved the feasibility of creating a Type 3 Medium beam pattern using the **OSLON** SSL LED. While numerous single lenses could be used to build a streetlight, a more practical method would be to integrate the optics into a cover lens as seen in **Figure 5**.

Figure 5. Example of optics integrated into the cover lens

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About OSRAM Opto Semiconductors

OSRAM is part of the industry sector of Siemens and one of the two leading lighting manufacturers in the world. Its subsidiary, OSRAM Opto Semiconductors GmbH in Regensburg (Germany), offers its customers solutions based on semiconductor technology for lighting, sensor and visualization applications. OSRAM Opto Semiconductors has production sites in Regensburg (Germany) and Penang (Malaysia). Its headquarters for North America is in Sunnyvale (USA), and for Asia in Hong Kong. OSRAM Opto Semiconductors also has sales offices throughout the world. For more information go to www.osram-os.com.

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