

## Aging Behaviour of LEDs Driven by PWM Including Power Supply and Electrostatic Discharge (ESD)

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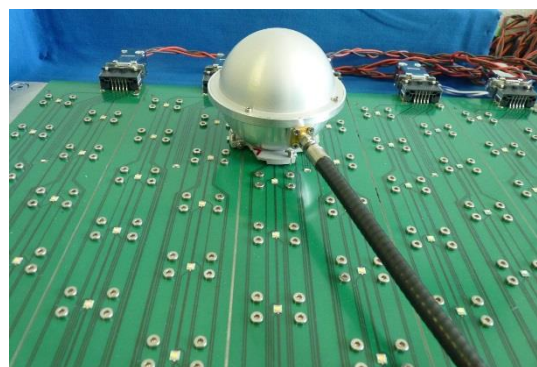
In former project "PQL (Performance Quality Label for LED-Luminaires)" the behaviour of different LEDs driven by different constant currents and under different temperature conditions was investigated [1, 2]. For regulation of the luminous flux of a LED the current driver is often operated by pulse width modulation (PWM) in practical applications because it is very easy to realize. Compared to constant current regulation (CCR) the operating point and the way of power dissipation of the LED vary. Usually aging specifications are published for test results based on measurements with CCR but the designer of luminaires needs information about aging in PWM operation. The possibly different aging process in this two operation modes of the current driver shall be investigated and modelled.

In manufacturing process LEDs can be damaged by ESD events although it seems to work very well. But degradation might be different and probably lifetime can be shortened.

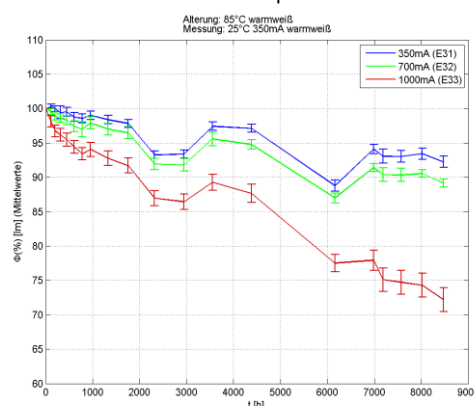
In the PhD-project degradation of LEDs concerning luminous flux and chromaticity coordinates in practical applications and its ESD-behaviour shall be investigated and modelled. The basics for a design guideline shall be developed for estimating the lifetime of LED-applications and a test for identification of pre-damaged LEDs.

[1] Homeyer, K.: „Alterungsuntersuchungen an Hochleistungs-LEDs bei verschiedenen Strömen und Temperaturen“, 5. Elektronik lighting congress, 07.05.2015, München.

[2] Homeyer, K.: „Alterungsuntersuchungen an Hochleistungs-LEDs: Verfahren, Beobachtungen, Messergebnisse“, LICHT 2014, Den Haag, 21.9.–24.09.2014, Tagungsband 21. Gemeinschaftst. S. 346-353.



Test equipment at HsH for aging investigations of LEDs under different temperature conditions



Degradation of luminous flux depending on current and temperature (constant current regulation)

This is a PhD-project of Tailored Light. Tailored Light is a coordinated PhD-programme of the Hanover Centre for Optical Technologies from the Leibniz Universität Hannover together with the Hochschule Hannover, the Laser Zentrum Hannover, the HAWK Hildesheim/ Holzwinden/ Göttingen, the TU Braunschweig and the TU Clausthal.

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