



January 31, 2022

BY EMAIL

S. Subbiah, CEO
Zemax
s.subbiah@zemax.com

Re: LED Headlights and Zemax Software

Dear S. Subbiah,

In the USA, the National Highway Transportation Safety Administration regulates vehicle headlights with their standard Federal Motor Vehicle Safety Standards, Section 108 which was written in 1967. FMVSS-108 is only applicable for substantially spatially uniform sources of light such as tungsten/halogen. NHTSA has never developed a headlight standard for flat surface emitters such as LEDs or lasers which generate highly concentrated, spatially non-uniform light.

FMVSS-108 regulates the minimum and maximum luminous intensity from headlights. Per NHTSA instructions, the measurement data is taken at a distance of 100 feet and after passing through the headlamp lenses and reflectors. The maximum luminous intensity allowed on a vehicle headlight is 70,000 candelas at the center of the headlight.

However, the primary measurement characteristic of an LED is its extreme luminance, which requires measuring at near-field distance in a precision laboratory. Measuring at 100 feet, as per NHTSA instructions, will not produce valid results. Since NHTSA has not created a headlamp standard for flat surface LEDs, the engineers who perform the measurements and self-certification process are left using processes that are not precise enough for LED measurements.

LED chip makers are making automotive LEDs that exceed 100,000,000 nits, while human comfort level is around 300 nits. What appears to be happening is that the automotive engineers are incorrectly using Zemax software to validate their headlights against the FMVSS-108 standard. The actions of these engineers have led to the auto makers invalidly self-certifying LED headlights as compliant with FMVSS-108. Rightly or wrongly, this is a liability issue for Zemax. The Soft Lights Foundation has already notified NHTSA and the auto manufacturers of their role in this liability issue.

The Soft Lights Foundation wishes to work with Zemax to address this issue. We envision Zemax contacting the engineers that use the Zemax software to alert them to this situation and to explain where the procedural errors are occurring. Once Zemax has properly notified and trained the engineers how to use the Zemax software for LED headlights, the liability issue will rest solely on the manufacturers such as General Motors and their suppliers such as Hella.

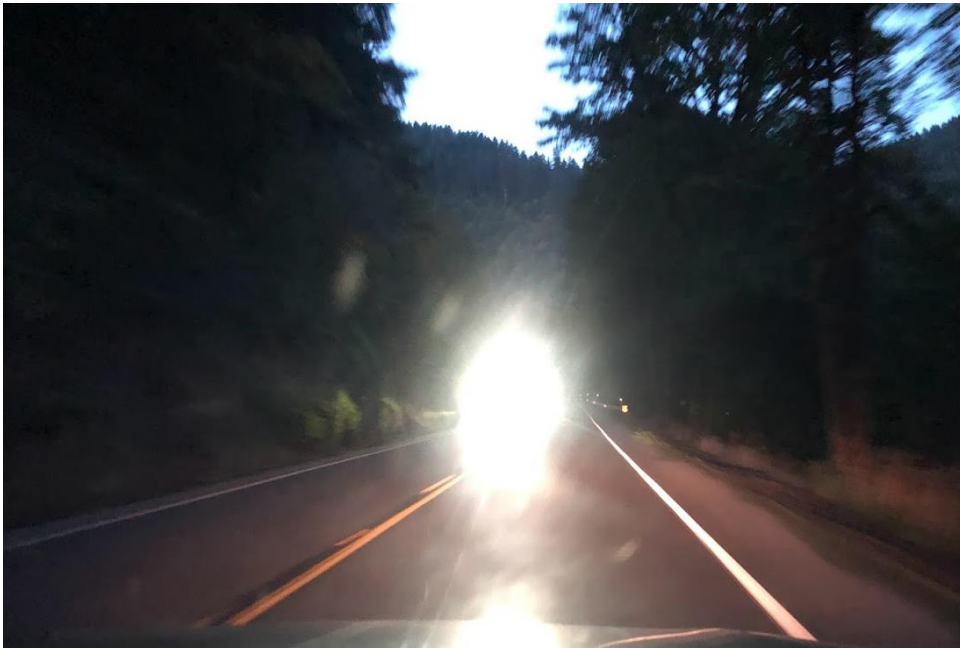


Figure 1 - LED Headlight Glare

Sincerely,

Mark Baker

Mark Baker
President

Soft Lights Foundation
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