

Temperature Prediction of an LED Bicycle Headlight

CATEYE Co., Ltd. Case Study HeatDesigner Function

Temperature predictions of an LED bicycle headlight using HeatDesigner compare favorably with measured values

LED Bicycle Headlight

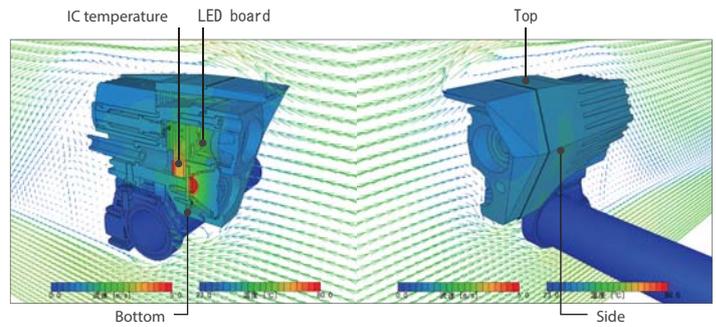
Today's high powered bicycle headlights use multiple LED light clusters to produce high intensity lighting that can approach the candlepower output of an automobile low beam headlight. This high output produces much heat. As a result, designing the bicycle headlight to maximize heat release becomes crucial.

CFD analysis was used to calculate the temperature rise in the Cateye HL-EL930RC bicycle headlight and identify thermal paths. The temperature predictions were compared to measured values, and the thermal paths showed the amount of heat release from each section of the light. This methodology can be used to design more efficient high output bike lights.

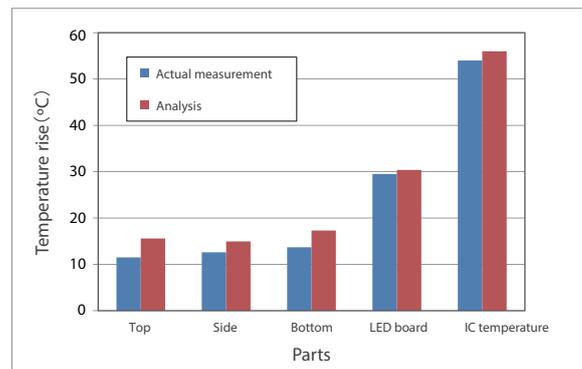


LED bicycle headlight (HL-EL930RC)

Measurement and simulation

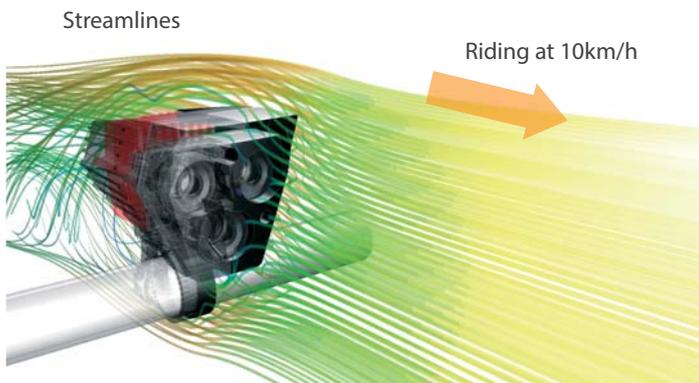


Simulated velocity vectors and temperature distribution



Temperature rise of each part

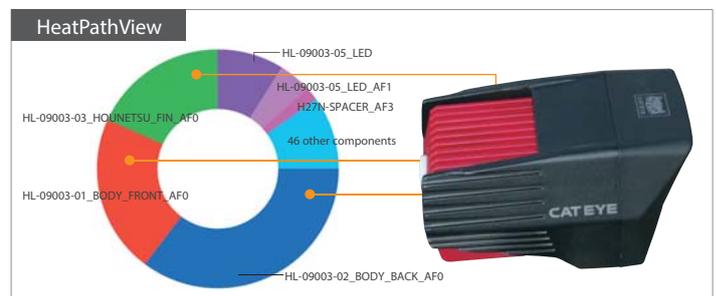
Benefits of simulation



Streamlines of air flow around the bike light

Simulates temperature with high accuracy

➔ Enables accurate comparison of different designs prior to hardware fabrication



Contribution of each section of the light to convection heat release into the air

Identifies which sections of the light contribute the most heat release

➔ This information can be used to improve and optimize the design

Customer Comments

CFD was used to evaluate heat release performance and predict temperature rise of a high output LED bicycle headlight. Test measurements validated the analytical predictions. Prototype development time and costs were reduced by accurately predicting temperatures for different headlight shapes and materials. HeatDesigner is an excellent design simulation tool for products subject to demanding thermal challenges.