

## Effect of Architecture and Operating Conditions of Vehicle on Bulb Lifetime in Automotive

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**Abstract :** Automotive lighting is the leading function in the configuration of vehicle architecture. Especially headlights and taillights from external lighting functions are among the structures that determine the stylistic character of the vehicle. At the same time, the fact that lighting functions are related to many other functions brings along difficulties in design. Customers expect maximum quality from the vehicle. In these circumstances, it is necessary to make designs that aim to keep the performance of bulbs with limited working lives at the highest level. With this study, the factors that influence the working lives of filament lamps were examined and bulb explosions that can occur sooner than anticipated in the future were prevented while the vehicle was still in the design phase by determining the relations with electrical, dynamical and static variables. Especially the filaments of the bulbs used in the front lighting of the vehicle are deformed in a shorter time due to the high voltage requirement. In addition to this, rear lighting lamps vibrate as a result of the tailgate opening and closing and cause the filaments to be exposed to high stress. With this study, the findings that cause bulb explosions were evaluated. Among the most important findings: 1. The structure of the cables to the lighting functions of the vehicle and the effect of the voltage values are drawn; 2. The effect of the vibration to bulb throughout the life of the vehicle; 3 The effect of the loads carried to bulb while the vehicle doors are opened and closed. At the end of the study, the maximum performance was established in the bulb lifetimes with the optimum changes made in the vehicle architecture based on the findings obtained.

**Keywords :** vehicle architecture, automotive lighting functions, filament lamps, bulb lifetime

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