

Introduction

ADB-SAFEGATE sponsored a research study that investigates the human factor (HF) based on visual perception in relation to the mixing of LED-Halogen technologies and LED Cool-Warm white lights in Airfield Ground Lighting (AGL) applications. A multidisciplinary team of experts, including aeronautical engineers, psychologists, HF experts from INECO, and pilots from Colegio Oficial de Pilotos de Aviación Civil (COPAC) developed a risk assessment methodology considering ICAO Doc. 9859 and HF methodologies. The results of this study are applicable exclusively when comparing to ADB-SAFEGATE technology.

Objective

The study aims to describe the project development and highlight the main conclusions of the Human Factor Analysis LED & Halogen and White Cool & Warm LED Technologies Mix in AGL. The report addresses the potential mix of Halogen & LED and Cool & Warm LED Technologies, analyzing the risks of operations due to the mix, based on the Human Factor (HF) Methodology.

Conclusions

The study's conclusions are based on the statistical analysis of pilots' answers to the perception questionnaires and the assessment of the risk associated with the perception of mixing lights after performing multiple flights with such mixed lighting technologies in various international airports and weather conditions. The responses indicate that the risk is in the acceptable or tolerable zone except for mixes higher than 50% of LED-Halogen mix. **This suggests that, except for the higher than 50% of LED-Halogen mix, the risk of the operations does not seem to be increased.**

Discussion

Understanding how LED lighting affects perceived brightness, color, and compatibility with existing infrastructure is crucial for safety. The study focused on assessing the visual perception of lights in different scenarios, their impact on pilots' senses and comprehension, and their reactions to the information. A group of pilots received training related to LED and Halogen airfield lights and answered questionnaires after flying in various international airports under different configurations and atmospheric conditions.

The research results set the baseline for the wide acceptance of LED-Halogen and warm-cool white LED lights combination based on pilots' sensory perception. However, the subjectivity associated with the answers in the expert judgment section of the questionnaire may affect the accuracy of the conclusions drawn. The research suggests that real mixing evaluation in subsystems required to be viewed simultaneously provides greater precision than the evaluation of adjacent and consecutive subsystems that are not required to be viewed at a specific moment.

Discover more insights and in-depth analysis by accessing the full [executive summary](#) of the study on our website.