The Sky Light Simulator Project

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Abstract

The aim of this paper is to provide a general description of an innovative project: the Sky Light Simulator. This new facility will be used for lighting tests in aeronautical projects (cockpit lighting evaluation) and will be available also for any kind of test in which the evaluation of human operator integration in illuminated environment is needed. The Sky Light Simulator will be able to carefully simulate diffused sky light in terms of illuminance and power spectra. A fully movable sun-pipe around the pilot's eyes will reproduce the solar disk size and angle of view.

Introduction

The cockpit panel of a modern aircraft is crowded with a multiplicity of displays, supplying all necessary information to the crew. Amongst these are warning or status indicators, multi-legend key or switch displays, alphanumeric optical read-outs, transluminated LCD (Liquid Crystal Display) or CRT (Cathode Ray Tube) multifunction colour displays, identification labels and painted colour surfaces, indicators, panels and displays utilising reflective legends with back-lit incandescent or LED lighting at night, back-lit with electro-luminescent sources at night, and Head Up and Helmet Mounted Displays.

During daytime flight, unfavourable static or dynamic light conditions may occur that cause critical situations of reduced legibility, particularly for displays (e.g. LCD) characterised by strong directional dependence of brightness and contrast. Difficult lighting conditions occur in a number of cases such as direct or reflecting sunlight shining onto the displays, sun in the forward field of view at low elevation angles, glare from the clouds. Night flight is also a critical condition on military aircraft if Night Vision Goggles are in use, since they require a suitable emission spectrum and luminance level of the cockpit illumination.

It is therefore desirable to develop techniques and systems to enable the designer to optimise and harmonise the cockpit configuration in terms of display position vs. typologies (e.g. CRT or LCD), luminosity and chromaticity of the displays, amount of information displayed, light sources and internal layout, also in terms of colour and reflectivity of the surface, pilot attention priority, etc.

In D. de Waard, K.A. Brookhuis, J. Moraal, and A. Toffetti (2002), *Human Factors in Transportation, Communication, Health, and the Workplace* (pp. 343 - 348). Maastricht, the Netherlands: Shaker.