

# Effects of Sun Controls on Buildings Interior lighting and thermal environment in hot arid regions

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## **Abstract -**

It is important to be able to determine the optimal window shading system because shading of windows in summer in hot climates is among the most important design parameters to achieve good indoor climatic conditions, to let in quality natural light but exclude undesired glare and control contrast ratios with minimal energy consumption. Over shading of the windows reduces daylighting, which results in an increased energy use for artificial lighting. This article investigates the impact of overhangs on incident solar radiation and daylight quality and quantity in office rooms under specific sky conditions of Algeria. The impact on incident solar radiation is analysed through a computer program written in Visual Microsoft Fortran according to an algorithm reported in reference [1], which is corrected according to the average sky condition of the analysed site. The impact on daylight quantity and quality is investigated through simulations with the program "Leso-D.I.A.L" [2], and evaluated in terms of necessary illumination level on the working plane. For purposes of theoretical study, the considered office is orientated to the south east direction wherefrom considerable quantities of solar radiations are received in summer, and also the day light is fairly diffused in the summer days in the northern latitudes. We use the term "geometrical shading coefficient" (GSC) to express the ratio between overhang and window area.

## **Résumé -**

Cet article examine l'impact des surplombs d'ouvertures sur le rayonnement solaire incident, ainsi que sur la quantité et la qualité de la lumière naturelle résultante dans les espaces à usage de bureau, sous les conditions climatiques spécifiques à l'Algérie. L'effet sur le rayonnement solaire incident est analysé à travers un programme informatique écrit sous "Visual Fortran" selon un algorithme rapporté dans la référence [1]. Les résultats sont corrigés ensuite selon les conditions moyennes de couverture du ciel du site considéré. L'effet sur l'environnement lumineux est examiné par un ensemble de simulations utilisant le logiciel "Leso-D.I.A.L" [2], évalué en terme des niveaux d'illuminance nécessaires. Le modèle de bureau considéré est orienté au sud-est, orientation considérée recevoir des quantités considérables de rayonnement solaires et représenter une configuration lumineuse assez diffuse durant la période d'été. Nous utilisons le terme "Geometrical Shading Coefficient" (GSC), pour exprimer le rapport des surfaces surplomb/ouverture.

**Key words:** Overhangs, Buildings, Daylighting, Solar radiation