Abstract

Daylight is one of the most important primary sources of light that has a great opportunity in increasing the esthetics of buildings. It is applicable for most building types all over the world but with some differences in dealing with daylighting design concepts to achieve the aimed quantity and quality of light.
The research main objective is the study of the reasons of using daylighting in buildings and how it is integrated in the design process through out its six chapters.

Chapter one reviews the main sources of light, vision and perception of lighted settings. It also reviews daylighting definition and main components, which are direct sunlight, skylight and reflected light. Daylit buildings have several benefits related to view, health, sustainability and an improved quality of light. Different examples are shown through out different historical periods (e.g., Ancient Egypt, Imperial Roman, Early Gothic and Ottoman period).

Chapter two shows the main design issues and parameters related to the quantity and quality of light. Design issues are those absolute definitions that are involved during the daylighting design process concerned with the quantity of light (e.g., illuminance, luminance and lighting power density) or quality of light (e.g. glare with its different types). Design Parameters are those constraints that affect the quantity or quality of light and affect the efficiency and suitability of daylighting techniques and change from a place to another (e.g. sky conditions, solar angles, orientation, building shapes and layouts, external obstructions, transmittance and surface reflectance).
Chapter two also shows the different design tools for calculating the daylight factor (e.g., formula methods, graphical methods, scale models and computer programs).

Chapter three studies the main tasks performed during the daylighting design process. Daylighting design involves daylighting the perimeter and the core of the building, i.e., supplying spaces in the perimeter and the core of the building with the suitable quantity and quality of light. Daylighting the perimeter and the core of the building includes selection or choice of daylight media (e.g., side lighting and top lighting) and integrated control elements (e.g., overhangs, louvers, drapes, Venetian blinds, etc).

Chapter four clarifies daylighting systems integration to ensure optimizing building integrated performance. Daylighting systems integration means the integration between daylighting design and other building systems (e.g. auxiliary lighting system, mechanical system, etc) which is the key for sustainability in buildings. Daylight saves no energy unless well designed and well integrated with auxiliary lighting system, mechanical system and other building systems.

Chapter five concludes the daylighting design process chart with its main phases and sequent steps starting from the design basis till commissioning and maintenance. Then introducing a comparative analysis of some existing international and local daylit buildings that are significant for their success in achieving the aimed quantity and quality of light using the appropriate daylighting media and control elements through a whole building integrated system.

Chapter six presents the research conclusions and general recommendations concerning integration of daylighting in the design process. It also suggests some recommendations for future researches.

Acknowledgment

Praise be to Allah for His favour to me in completing this work, praying Him to accept this as a sincere service for His sake and for the benefit of all mankind.

I would like to express my sincere gratitude, thanks and respect to Prof. Dr. Mohamed Moemen Afify. He was a sincere elder brother and respectable professor whose valuable guidance, advice and support were the main reasons for accomplishing this thesis.

I also thank Prof. Dr. Ahmed Reda Abdin who was, is and will always be our sincere father and respectable father.

Special thanks go to Assoc. Prof. Hanan Sabry who was one of the main reasons of my interest in Daylighting and its sustainable concepts in architecture.

I will always be so grateful and thankful towards Dr. Emad El Sherbiny for his great effort and support.

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