

"Toward Improving the Design of the Existing Building Envelope to Achieve Thermal Comfort in Educational Buildings: A Simulation-Based Approach" (Case Study of the Gezira Higher Institute of Engineering and Technology in Mokattam)

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Abstract:

The study aims to improve the design of the building envelope to achieve the best efficiency for the thermal performance of the existing building. The study sample was the Gezira Higher Institute of Engineering and Technology in Mokattam district. The study was based on thermal simulation of the building using the program Design Builder v4.2 - Energy Plus v.8.3 - Climate Consultant, through which a model of the building was developed that aims to improve the building envelope to achieve the best thermal performance. A questionnaire was conducted for the building users to study the impact of several variables and develop a model of the building after improvement that includes treatments that can be implemented. The research consists of three parts. The first part contains literature reviews of previous studies in this field. The second part contains an analytical study of the building envelope through conducting a field survey of building users over the year to collect data help in biomimetics to formulate the optimal concept for the experimental study. The third part contains an applied study of a proposed design for the building envelope to achieve thermal comfort for users in the selected drawing hall. The researcher recommends the need to establish mandatory laws for using specialized programs in the design process in its initial stages, and the need to use them in optimizing Building Envelope Design in the existing buildings and expanding the scope of research. The study aims to optimize building envelope design to achieve the best thermal performance efficiency for existing buildings. The study sample was the Al-Jazeera Institute of Engineering. The study relied on the thermal simulation of the building using the Design Builder v4.2 program the Energy Plus v.8.3 program and the climate consultant. Developing a model representing an educational building of the widespread type in the Mokattam district. The effect of building orientation, thermal insulation, shading, and alignment with the surrounding buildings on temperature, solar radiation, wind, humidity, and the building's thermal performance

Keywords:

Thermal Performance, Educational Buildings, Simulation, Existing building, Environmental design

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