

## **Title: Comparative Analysis of Thermal Performance for precast panel Systems with Conventional and Innovative Insulation Materials**

### **Presenting Author Details:**

#### **Presenting Author:**

- **Aya Hamdy Said Ragab**, Department of Architecture, Faculty of Engineering, Shebin El-Kom, Menoufia University, Menoufia, Egypt.

#### **Co-Authors:**

- **Eman Mohamed Eid Attiah**, Professor of History and Theory of Architecture, Faculty of Engineering, Shebin El-Kom, Menoufia University, Menoufia, Egypt.
- **Mohammed Adel Shebl**, Associate Professor, Department of Architecture, Faculty of Engineering, Shebin El-Kom, Menoufia University, Menoufia, Egypt.
- **Amal Abdel Hady Nasser**, Associate Professor, Department of Civil Engineering, Faculty of Engineering, Shebin El-Kom, Menoufia University, Menoufia, Egypt.

#### **Abstract:**

Precast facades are one of the most popular technology solutions featuring high quality implementation and installation. They consist of three layers, both the external and internal layers are concrete composite, where the core is a thermal insulation material. This study explores the thermal performance improvement of the manufactured panels in Egypt and evaluates their effectiveness in supporting building sustainability and energy saving. The study is performed experimentally. Leca and Addipor aggregate were used as a replacement of mix aggregate to produce lightweight heat-insulating concrete. Compressive strength equals 15MPa were taken for both Leca and Addipor replacement ratio. The study simulates several sections of precast concrete panels using ANSYS. Proposed concrete models with traditional and innovative thermal insulation materials, which are: Expanded Polystyrene Foam (EPS), Extruded Polystyrene Foam (XPS), Rigid polyurethane foam (PU) and Vacuum insulation panels (VIPs) were analyzed. In addition, a virtual room space was simulated thermally using the previous sections to perform thermal simulations, as rate of heat transfer and amount of energy savings. It was found that use of polyurethane foam (PU) as a new thermal insulation material and vacuum insulation panels (VIP) as an innovative thermal insulation material helps to reduce energy consumption by a rate of 143% and 700% of conventional insulation materials (EPS) respectively. It achieves internal thermal comfort and supports building sustainability.

#### **Biography:**

Dr. Aya Hamdy Said Ragab, an esteemed academician, currently holds the position of teacher at Department of Architecture Engineering in Faculty of Engineering, Menoufia University, Shebin El-Kom, Menoufia, Egypt. Boasting an extensive academic background, she obtained her B.Sc in Architecture Engineering from Department of Architectural Engineering, Faculty of Engineering, Menoufia University in 2012, followed by an M.Sc in Architectural Engineering with a specialization in Architectural design in 2017. Driven by a passion for deeper exploration, she culminated her academic journey with a Ph.D. in Architectural design with a focus on modern building technologies and innovative building materials especially

nanotechnology materials, which effectively contribute to preserving the environment, achieving indoor thermal comfort for building occupants, and reducing energy consumption.

she researches interests include research on environmental design and green orientation in construction through Modern building construction techniques, energy conservation and the use of nanomaterials in environmental conservation and sustainability to reduce harmful emissions and attempt to control climate. She participated in several international scientific conferences and published much scientific research in various local and international scientific journals.



- Email: [Aya.h.ragab90@gmail.com](mailto:Aya.h.ragab90@gmail.com)
- Full Name: Aya Hamdy Said Ragab
- University/Organization: Faculty of Engineering, Shebin El-Kom, Menoufia University.
- Country: Egypt.
- Mobile Number: 0201064143240
- Session/Track Name: Advanced Materials for Energy and Sustainability.
- Category (Oral/ Poster/ E-poster / Workshop): E-poster.
- Contact Address: Gamal Abd El Nasr st. - Shebin ElKoum – Menofia – Egypt.

Notes or Comments: