

Improving the Flexural Strength of Precast Concrete Lintels Through Sustainable Steel Reinforcement Configuration: An Experimental Study

Sarfo Mensah*

Department of Construction Technology and Quantity Surveying, Kumasi Technical University, Ghana

Collins Ameyaw

Department of Construction Technology and Quantity Surveying, Kumasi Technical University, Ghana

James Pabi Bampoh

Department of Construction Technology and Quantity Surveying, Kumasi Technical University, Ghana

Abstract:

Concrete lintels are indispensable structural components in buildings. However, lintel construction has been plagued by structural failure and deformation, especially in construction industries in tropical regions, such as Ghana. The objective of this study is to examine the impact of varying the precast lintel reinforcement design configuration on its flexural strength. Experimental research was conducted to achieve this goal. Three different reinforcement design configurations were prepared to mold six precast concrete lintel specimens with dimensions of 1200 mm × 150 mm × 225 mm. Split, slum, and flexural strength tests were conducted on the specimens. The triangular reinforcement design exhibited the highest load-bearing capacity. The maximum loads that the rectangular and square configurations could carry were relatively low. The introduction of a triangular reinforcement design for precast lintel, which has demonstrated superior load-bearing capacity in the practice of precast lintel construction, has multifaceted returns of improving structural integrity, introducing cost efficiency, and fulfilling sustainability requirements. Triangular design is a novel approach in the context of precast concrete lintels, offering a fresh perspective on reinforcement strategies that deviate from conventional methods. By potentially reducing the amount of material required for reinforcement while achieving higher strength, triangular design contributes to more sustainable construction practices. This aligns with global trends towards sustainability in engineering and construction.

Keywords:

Experimental research, flexural strength, precast lintel, reinforcement sectional design, steel reinforcement.