

# Flexural behavior of reinforced concrete beam incorporating waste glass powder

Sheelan MahmoudHama Akram ShakirMahmoud Mohamed MahirYassen

## Abstract

Concrete is the most widely used material in the construction industry, which is responsible for some of the most serious sustainability and environmental issues currently faced worldwide. Recycled materials, such as waste glass (WG) generated from newly processed construction waste, can potentially conserve natural cement, eliminate unnecessary consumption of limited landfill areas, and reduce energy consumption. Most of the previous studies on the usage of WG as powder tackled the mechanical properties, but the current work focuses on the structural performance of reinforced concrete (RC) beams incorporating WG powder. This research investigates the effect when WG powder is used as a replacement in the following cement weight percentages: 0% (reference), 10%, and 15%. Similarly, the structural behavior of RC beams containing WG powder was examined. Nines beams (dimension: 150 mm width, 150 mm depth, and 900 mm span length) were used in this study. In addition to the effect of glass powder on flexural behavior, two other parameters were considered: the influence of longitudinal steel reinforcement (2Ø8 mm,  $\rho = 0.0049$ ; 2Ø12 mm,  $\rho = 0.013785$ ) on rebar and the spacing between transverse reinforcement (stirrups; 65 and 170 mm). Beams containing WG powder showed good resistance and satisfactory flexural performance compared with reference beams.