

EXPERIMENTAL STUDY ON THE FLEXURAL CAPACITY OF REINFORCED CONCRETE BEAMS RETROFITTED WITH STRUCTURAL REPAIR MORTARS

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ABSTRACT

Reinforced concrete bridge beams can suffer a reduction in capacity due to damage, necessitating repair methods to restore their structural performance. One such method is retrofitting using structural repair mortar, either with or without the use of dynabolts. This study aims to analyze the flexural capacity and identify the crack patterns of beams retrofitted with mortar, comparing those with dynabolts to those without. The study utilized four reinforced concrete beams measuring 150 × 200 × 1400 mm: two retrofitted with mortar and dynabolts, and two retrofitted with mortar alone. Retrofitting was performed when the concrete was 28 days old, followed by flexural testing at 56 days. Test results indicated ultimate loads of 40.4 kN and 45.5 kN for the beams with dynabolts, and 45.1 kN and 42.2 kN for the beams without dynabolts. Based on average values, the beams with dynabolts exhibited an ultimate load of 42.95 kN, while those without dynabolts showed 43.65 kN, representing an average capacity difference of 1.60%. Observations of crack patterns revealed that both groups of beams experienced crack development in the flexural zone. Initial cracking occurred at loads of 14.7 kN and 12.3 kN for the beams with dynabolts, whereas for the beams without dynabolts, it occurred at 22.5 kN and 34.4 kN. These results indicate that while the beams with and without dynabolts differed in flexural capacity and initial cracking loads, their average ultimate capacities were relatively similar.

Keywords: retrofit, repair mortar, dynabolts, flexural capacity, crack pattern.