

PENGARUH PENGGUNAAN *REPAIR MORTARS* *STRUCTURAL* DAN PENAMBAHAN TULANGAN TERHADAP KAPASITAS LENTUR BALOK BETON BERTULANG *PASCA RETROFIT*

Nama Mahasiswa : Muhammad Alfisar
NIM : 4204221523
Dosen Pembimbing I : Dedi Enda, ST.,M.T
Dosen Pembimbing II : Roma Dearn, ST.,M.T

ABSTRAK

Degradasi kapasitas struktur balok beton bertulang menuntut metode perbaikan (*retrofit*) yang efektif. Penelitian eksperimental ini bertujuan menganalisis pengaruh kombinasi *structural repair mortar* non-susut (Mapefill GP) dan penambahan tulangan samping (2D10) terhadap kapasitas lentur balok beton bertulang pasca *retrofit*. Benda uji berupa balok berdimensi 140 cm × 22 cm × 24,1 cm diuji menggunakan metode pembebanan dua titik (*two-point loading*) pada umur 28 hari. Hasil pengujian menunjukkan balok kontrol dengan tulangan samping mengalami retak awal (P_{cr}) pada beban 51,1 - 2,84 kN (lendutan 2,3 mm) dan mencapai beban ultimit maksimum (P_{ult}) sebesar 75,7-76,07 kN. Sementara itu, balok pasca *retrofit* menunjukkan retak awal pada 43,1 kN (lendutan 3,0 mm) serta mampu menahan beban ultimit maksimum sebesar 67,6-69,5 kN. Kedua variasi mengalami mode keruntuhan lentur daktail. Penambahan tulangan tanpa *retrofit* menghasilkan kapasitas ultimit 10,55 % lebih tinggi dibandingkan balok *retrofit*. Meskipun demikian, aplikasi *structural repair mortar* yang terintegrasi dengan tulangan tambahan terbukti mampu memulihkan 88,9 %\$ hingga 91,3 % kapasitas beban ultimit balok awal. Dengan demikian, metode *retrofit* kombinasi ini dinyatakan efektif dalam mengembalikan kinerja struktural dan kapasitas lentur balok beton bertulang yang mengalami kerusakan.

Kata Kunci: Balok beton bertulang, Kapasitas lentur, Pembebanan dua titik, *Repair mortar struktural*, *Retrofit*.

**PENGARUH PENGGUNAAN *REPAIR MORTARS*
STRUCTURAL DAN PENAMBAHAN TULANGAN TERHADAP
KAPASITAS LENTUR BALOK BETON BERTULANG *PASCA*
*RETROFIT***

Name : Muhammad Alfisar
Student Id Number : 4204221523
Advisor I : Dedi Enda, ST.,M.T
Advisor II : Roma Dearn, ST.,M.T

ABSTRACT

The structural capacity degradation of reinforced concrete beams requires an effective retrofitting method. This experimental study aims to analyze the effect of combining non-shrink structural repair mortar (Mapecfill GP) and additional side reinforcement (2D10) on the flexural capacity of post-retrofit reinforced concrete beams. Test specimens consisting of beams with dimensions of 140 cm × 22 cm × 24.1 cm were tested under a two-point loading configuration at 28 days of age. Test results revealed that control beams with side reinforcement exhibited initial cracking (P_{cr}) at 51.1 - 52.84 kN (deflection of 2.3 mm) and attained a maximum ultimate load (P_{ult}) of 75.7 - 76.07 kN. Meanwhile, the post-retrofit beams initiated cracking at 43.1 kN (deflection of 3.0 mm) and sustained a maximum ultimate load of 67.6 - 69.5 kN. Both beam configurations demonstrated ductile flexural failure modes. The non-retrofitted beam with side reinforcement showed a 10.55 % higher ultimate capacity compared to the retrofitted beam. Nevertheless, the integration of structural repair mortar with additional reinforcement effectively recovered 88.9 % to 91.3 % of the initial beam's ultimate load capacity. Consequently, this combined retrofitting scheme is proven effective in restoring the structural performance and flexural capacity of damaged reinforced concrete beams.

Keywords: *Flexural capacity, Post-retrofit, Reinforced concrete beam, Structural repair mortar, Two-point loading.*