

## ABSTRAK

### STUDI EKSPERIMENTAL PERKUATAN BALOK BETON BERTULANG DENGAN KOMBINASI GFRP DAN WIREMESH

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Penelitian pada skripsi ini merupakan studi eksperimental untuk menyelidiki perilaku lentur elemen balok beton bertulang yang diperkuat dengan kombinasi GFRP dan *wiremesh* terhadap balok normal tanpa perkuatan. Balok beton dengan total panjang 1700 mm, lebar dan tinggi 150 mm sebanyak 6 buah dipergunakan dengan kuat tekan beton 26,43 MPa. Dua balok tanpa perkuatan (BN) dan 2 buah dengan perkuatan *wiremesh* 2 lapis (BW) dan 2 balok lagi dengan perkuatan kombinasi 2 lapis GFRP dan 1 lapis *wiremesh* (BGW).

Balok diuji diatas dua perletakan sederhana terhadap 2 beban titik diatasnya dilakukan secara bertahap sampai balok runtuh/gagal. Hasil eksperimen menunjukkan bahwa kapasitas beban pada BW 2 meningkat sebesar 11,32% terhadap BN 1 dan meningkat 27,71% terhadap BN 2, sedangkan BGW 1 mengalami peningkatan sebesar 69,81% terhadap BN 1 dan 94,80% terhadap BN 2, sementara untuk balok BGW 2 mengalami peningkatan sebesar 75,47% terhadap BN 1 dan 101,30% terhadap BN 2. Dari hasil penelitian balok yang menggunakan perkuatan, hanya balok BW 1 yang mengalami penurunan kapasitas beban yaitu sebesar 24,15% terhadap BN 1 dan 12,99% terhadap BN 2.

Balok tanpa perkuatan mengalami kegagalan lentur dengan beton hancur setelah tulangan meleleh. Begitu juga balok dengan perkuatan *wiremesh* patah ditengah bentang dengan perilaku yang sama. Sebaliknya balok dengan perkuatan gabungan GFRP dan *wiremesh* mengalami kegagalan dengan terlepasnya perkuatan di bagian salah satu ujungnya yang dikenal dengan istilah *debonding failure*.

Kata kunci: beton bertulang, perkuatan, GFRP, *wiremesh*, kapasitas beban.

## **ABSTRACT**

### **EXPERIMENTAL STUDY OF STRENGTHENING REINFORCED CONCRETE BEAM WITH GFRP AND WIREMESH COMBINATION**

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The research on this thesis are about experimental study for investigating flexure behaviour of reinforced concrete beam that strengthened with GFRP and wiremesh in comparison with normal reinforced concrete beam. Six concrete beams with length 1700 mm, width and height 150 mm and compressive strength of 26,43 MPa are used in this study. Two beams without using any strengthening (BN) and 2 beams with 2 layers of wiremesh strengthening (BW) and 2 beams with 2 layers of GFRP and 1 layer of wiremesh strengthening (BGW).

The beams was tested over two simple restrain against two point loads above it, the test are done gradually until the beams was collapsed/fail. The experiment shows that the load capacity of BW 2 increased by 11,32% in comparison with BN 1 and increased 27,71% in comparison with BN 2, while BGW 1 have increased the load capacity by 69,81% in comparison with BN 1 and increased by 94,80% in comparison with BN 2, while for BGW 2 have increased the load capacity by 75,47% in comparison with BN 1 and increased by 101,30% in comparison with BN 2. Based on the experiment from strengthened beams, it shows only BW 1 have decreased load capacity by 24,15% in comparison with BN 1 and decreased by 12,99% in comparison with BN 2.

Normal reinforced concrete beams experience flexural failure with the concrete failed before the reinforcement yielded. The same with beams that are strengthened with wiremesh fail with broken in the middle of the span. On contrary beams with combination of GFRP and wiremesh failure are caused by the loosened of the strengthened in the end of span known as debonding failure.

Keyword : reinforced concrete, strengthening, GFRP, wiremesh, load capacity.