

ABSTRACT

FLEXURAL BEHAVIOR OF LIGHTWEIGHT CONCRETE PANEL REINFORCED WITH M7 WIRE MESH

By

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Lightweight concrete panels are an innovative construction material with lower weight compared to normal concrete, thereby reducing the dead load of structures. This study aims to analyze the flexural behavior of lightweight concrete panels reinforced with M7 wire mesh under point load and uniformly distributed loading conditions. The parameters evaluated include load capacity, load–deflection relationship, load–strain relationship, crack patterns, and panel failure mechanisms.

The study was conducted at the Materials and Construction Laboratory, Universitas Lampung, using two lightweight concrete panels with dimensions of $2400 \times 600 \times 125$ mm. The lightweight concrete mixture consisted of PCC cement, fine aggregate passing a 2.36 mm sieve, GF 1420 foam agent, and Naptha E 1.2.1 as a additive. The panels were reinforced with M7 wire mesh and tested at the age of 28 days using a loading frame equipped with a load cell, LVDT, strain gauge, and 8-channel data logger to record the structural response during loading. Material testing results indicated that the average compressive strength of the lightweight concrete was 6.055 MPa, while the average yield strength of the reinforcing steel was 567.5 MPa.

The results showed that the panel subjected to uniformly distributed loading had a greater load capacity than the panel subjected to concentrated loading due to a more uniform stress distribution within the cross-section. The actual load capacity under uniformly distributed loading reached 12.2356 kN, while under point loading it reached 9.0221 kN. The maximum deflections recorded were 14.3560 mm and 13.4253 mm for uniformly distributed and point loading, respectively. The failure pattern observed in the panel was predominantly characterized by cracks initiating in the tension zone and propagating toward the upper fibers, indicating that the failure mechanism was flexural failure.

Keywords: Lightweight concrete panel, lightweight concrete, flexural capacity, uniformly distributed load, point load.

ABSTRAK

LENTUR PANEL BETON RINGAN DENGAN PERKUATAN TULANGAN *WIRE MESH* M7

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Panel beton ringan merupakan inovasi material konstruksi yang memiliki berat lebih rendah dibandingkan beton normal sehingga dapat mengurangi beban mati struktur. Penelitian ini bertujuan untuk menganalisis perilaku lentur panel beton ringan bertulangan *wire mesh* M7 terhadap pembebanan terpusat dan beban merata. Parameter yang dianalisis meliputi kapasitas beban, hubungan beban–lendutan, hubungan beban–regangan, pola retak, serta mekanisme keruntuhan panel.

Penelitian dilakukan di Laboratorium Bahan dan Konstruksi Universitas Lampung menggunakan dua panel beton ringan berdimensi $2400 \times 600 \times 125$ mm. Campuran beton ringan menggunakan semen PCC, agregat halus lolos saringan 2,36 mm, *foam agent* GF 1420, serta bahan aditif Naptha E 1.2.1. Panel menggunakan *wire mesh* M7 dan diuji pada umur 28 hari menggunakan *loading frame* dengan bantuan *load cell*, LVDT, *strain gauge*, dan data logger 8-Channel untuk merekam respons struktur selama pembebanan. Karakteristik material hasil pengujian menunjukkan kuat tekan rata-rata beton ringan sebesar 6,055 MPa dan kuat leleh rata-rata baja tulangan sebesar 567,5 Mpa.

Hasil penelitian menunjukkan bahwa panel dengan pembebanan merata memiliki kapasitas beban lebih besar dibandingkan panel dengan pembebanan terpusat karena distribusi tegangan yang terjadi pada penampang lebih merata. Kapasitas aktual panel pada pembebanan merata mencapai 12,2356 kN, sedangkan pada pembebanan terpusat sebesar 9,0221 kN dengan lendutan maksimum yang terjadi masing-masing sebesar 14,3560 mm dan 13,4253 mm untuk beban merata dan beban terpusat. Pola keruntuhan yang terjadi pada panel didominasi oleh retak pada zona tarik yang menjalar ke arah serat atas, menunjukkan bahwa mekanisme keruntuhan yang terjadi merupakan keruntuhan lentur.

Kata kunci: Panel beton ringan, beton ringan, kapasitas lentur, beban merata, beban terpusat.