

ABSTRACT

FLEXURAL PERFORMANCE EVALUATION OF INDUSTRIAL PRODUCED LIGHTWEIGHT FLOOR PANELS UNDER POINT LOAD AND UNIFORM LOAD

By

TARISA RAMADHANI

The development of the modern construction industry demands efficient, lightweight, and fast-to-install materials, such as precast lightweight concrete floor panels. This study evaluates the flexural behavior and failure patterns of industrially produced lightweight floor panels under point loads and uniformly distributed loads. The evaluation compares laboratory test results with theoretical calculations based on SNI 2847:2019 and the manufacturer's specifications.

Experimental testing was conducted on panel specimens measuring $2470 \times 600 \times 125$ mm. The instruments used included an 8-channel data logger, Load Cell, LVDT for deflection measurement, and strain gauges connected to a strain indicator. Material testing showed an average concrete compressive strength (f'_c) of 5.085 MPa and reinforcement yield strength (f_y) ranging from 425–440 MPa.

The results indicate that the panels performed better under uniformly distributed loads, achieving an actual capacity of 10.2157 kN, exceeding the manufacturer's claimed capacity of 8.7231 kN. Under point loading, the capacity reached only 7.4675 kN due to stress concentration at the loading point. Failure in both loading conditions was dominated by concrete compression before the reinforcement reached full yield, caused by the large disparity between the steel and lightweight concrete strengths. Maximum deflection under point load (9.9701 mm) was greater than under uniform load (6.7177 mm), indicating that uniformly distributed loading improves the panel's effective stiffness against flexural deformation.

Keyword: Lightweight Concrete, Precast Floor Panel, Flexural Capacity, Point Load, Uniform Load.

ABSTRAK

EVALUASI PERFORMA LENTUR PANEL LANTAI RINGAN PRODUKSI INDUSTRI AKIBAT BEBAN TERPUSAT DAN BEBAN MERATA

Oleh:

TARISA RAMADHANI

Perkembangan industri konstruksi modern menuntut penggunaan material yang efisien, ringan, dan cepat dalam pelaksanaan, seperti panel lantai beton ringan pracetak. Penelitian ini bertujuan mengevaluasi perilaku lentur dan pola keruntuhan panel lantai ringan produksi pabrik terhadap variasi pembebanan terpusat dan beban merata. Evaluasi dilakukan dengan membandingkan hasil pengujian laboratorium terhadap perhitungan kapasitas teoritis berdasarkan SNI 2847:2019 dan spesifikasi teknis pabrikan.

Metode penelitian dilakukan melalui pengujian eksperimental pada benda uji panel berukuran $2470 \times 600 \times 125$ mm. Instrumen yang digunakan meliputi data logger 8-channel, Load Cell, LVDT untuk pengukuran lendutan, serta strain gauge yang terhubung dengan strain indicator. Hasil pengujian material menunjukkan kuat tekan beton rata-rata (f'_c) sebesar 5,085 MPa dan kuat leleh tulangan (f_y) berkisar antara 425–440 MPa.

Hasil penelitian menunjukkan bahwa panel memiliki performa lebih optimal pada kondisi beban merata dengan kapasitas aktual sebesar 10,2157 kN, melebihi kapasitas yang diklaim pabrikan sebesar 8,7231 kN. Sementara itu, pada pembebanan terpusat kapasitas hanya mencapai 7,4675 kN akibat terjadinya konsentrasi tegangan pada titik pembebanan. Pola keruntuhan pada kedua jenis pembebanan didominasi oleh keruntuhan tekan beton sebelum tulangan mencapai kondisi leleh penuh, yang dipicu oleh perbedaan signifikan antara mutu baja tulangan dan mutu beton ringan. Lendutan maksimum pada beban terpusat (9,9701 mm) lebih besar dibandingkan beban merata (6,7177 mm), yang menunjukkan bahwa distribusi beban merata meningkatkan kekakuan efektif panel dalam menahan deformasi lentur.

Kata Kunci: Beton ringan, panel lantai pracetak, kapasitas lentur, beban terpusat, beban Merata.