



INTISARI

Pertumbuhan jumlah kendaraan di lingkungan Fakultas Teknik, Universitas Gadjah Mada menimbulkan kebutuhan yang semakin besar terhadap fasilitas parkir yang memadai. Keterbatasan lahan mendorong pemanfaatan solusi berupa pembangunan gedung parkir bertingkat yang mampu menampung kapasitas lebih besar tanpa memperluas area horizontal. Dalam konteks ini, material baja dipilih sebagai elemen utama karena memiliki sejumlah keunggulan, antara lain efisiensi waktu konstruksi, fleksibilitas dalam pengaturan ruang, rasio kekuatan terhadap berat yang tinggi, serta potensi adaptasi terhadap pengembangan vertikal. Selain faktor tersebut, penggunaan baja juga dianggap relevan untuk wilayah Yogyakarta yang tergolong rawan gempa, sehingga diperlukan sistem struktur yang mampu memberikan ketahanan optimal terhadap beban lateral.

Perancangan struktur gedung parkir lima lantai ini mengacu pada Sistem Rangka Pemikul Momen Khusus (SRPMK), yaitu sistem dengan daktilitas tinggi yang memungkinkan bangunan tetap stabil dan aman melalui mekanisme plastis yang terkontrol dalam menyerap energi gempa. Pendekatan perancangan menggunakan metode *Load and Resistance Factor Design* (LRFD) sesuai SNI 1729:2020, dengan pembebanan berdasarkan SNI 1727:2020 serta ketentuan perencanaan gempa mengacu pada SNI 1726:2019. Proses analisis struktur dilakukan dengan perangkat lunak ETABS v22.0.0 dan diperkuat melalui perhitungan manual menggunakan *Microsoft Excel*.

Rangkaian analisis mencakup penentuan kombinasi beban, evaluasi perilaku dinamis struktur seperti *mode shape*, periode fundamental, dan partisipasi massa, serta pemeriksaan simpangan antar lantai, stabilitas global, dan kapasitas elemen utama berupa kolom, balok, dan sambungan. Hasil menunjukkan bahwa sistem struktur baja gedung parkir memenuhi persyaratan batas layan maupun batas ultimit, serta dapat menjadi alternatif material yang layak untuk bangunan bertingkat di wilayah rawan gempa.

Kata kunci: Struktur baja, Gedung parkir bertingkat, SRPMK, Bangunan tahan gempa; Analisis struktur



ABSTRACT

The rapid increase in the number of vehicles within the Faculty of Engineering, Universitas Gadjah Mada's campus has generated a growing demand for adequate parking facilities. Limited land availability has encouraged the adoption of multi-story parking buildings as an effective solution to accommodate higher capacity without expanding the horizontal area. In this context, steel was selected as the primary structural material due to its various advantages, including faster construction time, spatial flexibility, high strength-to-weight ratio, and adaptability for vertical expansion. Beyond these advantages, steel is also considered relevant for Yogyakarta, a region categorized as earthquake-prone, thereby requiring a structural system capable of providing optimal resistance against lateral loads.

The design of this five-story parking building adopts the Special Moment Resisting Frame (SMRF) system, which provides high ductility and ensures structural stability and safety through controlled plastic mechanisms that effectively dissipate seismic energy. The design approach follows the Load and Resistance Factor Design (LRFD) method in accordance with SNI 1729:2020, with load provisions based on SNI 1727:2020 and seismic design criteria referring to SNI 1726:2019. Structural analysis was conducted using ETABS v22.0.0 software, complemented by manual verification with Microsoft Excel.

The analytical process includes load combinations, evaluation of dynamic behavior such as mode shapes, fundamental periods, and mass participation, as well as checks on inter-story drift, global stability, and the capacity of key structural components including columns, beams, and connections. The results indicate that the steel structural system of the parking building satisfies both serviceability and ultimate limit states, and can be considered a viable alternative material for multi-story buildings in seismic regions.

Keywords: Steel structure, Parking building, Special Moment Resisting Frame, Earthquake-resistant design, Structural analysis