

Analisis dan Desain Struktur Irregular pada Gedung Tower Laboratorium DTS UI dengan Integrasi Building Information Modelling (BIM) = Analysis and Design of Irregular Structure in Laboratory Tower Building Using Building Information Modelling (BIM) Integration

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Abstrak

Seiring dengan perkembangan dunia konstruksi, konsep Building Information Modelling (BIM) semakin banyak digunakan terutama di Indonesia. Konsep BIM ini akan diterapkan pada proses analisis dan desain struktur dengan ketidakberaturan untuk melihat efektifitas BIM dalam proses modelling dan analisis struktur. Studi kasus pada penelitian ini adalah Tower Laboratorium Departemen Teknik Sipil Universitas Indonesia 10 tingkat yang memiliki ketidakberaturan torsi, diskontinuitas diafragma, sudut dalam, ketidakberaturan massa, dan ketidakberaturan kekakuan. Konsep integrasi BIM akan diterapkan pada Autodesk Revit 2023 sebagai software modelling dan ETABS Versi 21 sebagai software analisis struktur. Struktur akan di desain berdasarkan gaya gempa respon spektrum, dan riwayat waktu linear untuk melihat perbedaan respon struktur. Ditemukan bawah beban gempa respon spektrum memberikan respon yang lebih besar pada arah Y, sedangkan beban gempa riwayat waktu linear memberikan respon yang lebih besar pada arah X. Beban gempa respon spektrum memberikan tambahan kebutuhan penampang sebanyak 0.64% (21 m³) dan penambahan kebutuhan penulangan sebanyak 1.35% (7805 kg) daripada beban gempa riwayat waktu linear. Terdapat perbedaan biaya sebesar Rp173.442.791 akibat perbedaan metode analisis. Integrasi BIM memiliki kelebihan dalam melakukan pertukaran data antar software namun memiliki kelemahan dalam sisi akurasi pemindahan data tulangan.

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Along with developments in the world of construction, the concept of Building Information Modeling (BIM) is increasingly used, especially in Indonesia. The BIM concept will be applied to the process of analysis and design of structures with irregularities to see the effectiveness and performance of BIM in the process of modeling and structural analysis. The case study in this research is a Tower Laboratory of the Department of Civil Engineering Universitas Indonesia with 10 levels and having torsional irregularities, diaphragm discontinuity, re entrant corner, mass irregularities, and stiffness irregularities. The BIM integration concept will be applied to Autodesk Revit 2023 as a modeling software and ETABS V21 as a structural analysis software. The structure will be designed based on response spectrum and linear time history to see differences in structural response. It was found that the spectrum response earthquake load gave a greater response in the Y direction, while the linear time history earthquake load gave a greater response in the X direction. The spectrum response earthquake load gave an additional cross section requirement of 0.64% (21 m³) and additional reinforcement requirements as much as 1.35% (7805 kg) of the linear time history earthquake load. There is a difference in costs of IDR 173,442,791 due to differences in analytical methods. BIM integration has advantages in exchanging data between software but has weaknesses in terms of the accuracy of transferring reinforcement data.