Evaluasi perancangan sambungan rigid kolom dasar rangka baja di atas rangka beton bertulang menggunakan analisis pushover = Evaluation of rigid column base connection on steel frames above reinforced concrete frames using pushover analysis

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Abstrak

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Adanya peningkatan KLB (Koefisien Lantai Bangunan) pada daerah padat di Jakarta, memungkinkan para pemilik gedung melakukan perluasan bangunan secara vertikal dengan menambah struktur baja di atas struktur beton bertulang eksisting. Seringkali sambungan rigid dipakai pada sambungan kolom dasar struktur baja di atas struktur beton dengan mengasumsikan terjadi hubungan menerus antara baja dengan beton. Pada kenyataanya asumsi ini belum tentu benar akibat dari kemampuan sambungan sesungguhnya yang terbatas oleh kapasitas dan kekakuannya. Sehingga asumsi tersebut perlu dievaluasi kebenarannya demi menjaga perilaku struktur dan sambungan.
Untuk itu, penelitian ini melakukan evaluasi hasil perancangan sambungan rigid pada dasar kolom baja dengan memodelkan sambungan menjadi pegas yang menghubungkan struktur baja dan struktur beton. Kekakuan rotasi sambungan dimodelkan secara non-linier untuk mendapatkan perilaku pasca leleh dari analisis pushover. Kekakuan sambungan diperoleh dari konfigurasi sambungan hasil perancangan yang melibatkan nilai overstrength factor (Wo) sesuai ketentuan AISC 341. Pada penelitian ini terdapat 7 variasi kekakuan sambungan yang didasarkan variasi Wo pada kombinasi gaya-gaya di sambungan dan mutu angkur (Fu) pada nilai Wo tertentu.
Hasil penelitian menunjukkan penurunan besarnya kekakuan sambungan akibat penurunan nilai Wo tidak mengurangi aksi sambungan rigid. Adanya variasi nilai Wo pada perancangan sambungan rigid tidak berpengaruh langsung nilai R dan Wo dari hasil pushover. Adanya variasi mutu angkur (Fu) juga tidak berpengaruh signifikan pada perilaku struktur. Hanya sambungan yang didesain dengan Wo = 1 menunjukkan perilaku non linier dan dimungkinkan terjadinya gagal geser. Untuk menjaga kekuatan di sambungan saat terjadi gempa di luar rencana pada struktur dan menjamin agar sambungan tetap berperilaku elastik, sambungan perlu didesain dengan menggunakan Wo minimal sebesar 1,5.
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ABSTRACT
An increase in Floor Area Ratio (KLB) in dense areas of Jakarta, enabling building owners to extend their building vertically by adding the steel frame structures above the existing reinforced concrete structures. A rigid connection of

steel column bases above the concrete structures is often used by assuming a continous joint between steel and concrete. In the fact, this assumption is not necessarily true since the connection behaviour is limited to the capacity and stiffnesses. This may lead to evaluate the assumption so the overall structural and connection behaviour are controlled.

Therefore, this research evaluates the rigid connection design by modeling the column base connections using spring connecting steel frame structures and concrete frame structures. The non linear rotational stiffness of the spring is modelled to obtain post yielding behavior from the pushover analysis. The connection stiffnesses are provided from connection designs involving overstrength factor (Wo) as prescribed in AISC 341. There are 7 connection stiffness variations are built in this research based on Wo variations on loading combinations and anchor grade variations (Fu) for certain value Wo.

The results showed a decrease in connection stiffness due to reduction value of Wo independent to the connection rigidity actions. Variation of Wo in the rigid connection design has no direct impact on the value of R and Wo from pushover analysis. The anchor grade variations has no significant effect on the structural performance. The non linear behaviour and possibility of shear failure of the connections are happened only when using Wo = 1. The connections shall be designed by minimum Wo = 1,5 to ensure the connection strength and the connection behavior still remains elastically when a greater earthquake force is subjected to the structure;An increase in Floor Area Ratio (KLB) in dense areas of Jakarta, enabling building owners to extend their building vertically by adding the steel frame structures above the existing reinforced concrete structures. A rigid connection of steel column bases above the concrete structures is often used by assuming a continous joint between steel and concrete. In the fact, this assumption is not necessarily true since the connection behaviour is limited to the capacity and stiffnesses. This may lead to evaluate the assumption so the overall structural and connection behaviour are controlled.

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