Evaluasi kinerja sistim struktur penahan beban lateral dinding geser beton bertulang dengan outrigger = Performance evaluation of reinforced concrete shear wall with outrigger retaining lateral load system

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Abstrak

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Outrigger ditujukan untuk memberikan kekangan rotasi pada dinding geser dan kolom-kolom eksternal yang diperkaku belt truss merupakan komponen penahan
aksial akibat aksi dari outrigger. Penelitian Lee (2008), Taranath (2010), Fawzia (2011) dan peneliti lainnya menunjukkan aksi outrigger ini dapat mereduksi
momen nominal dinding geser dan meminimalisir simpangan lateral bangunan. Namun akibat kekangan outrigger ini menimbulkan tegangan tambahan pada dinding geser pada lokasi dimana outrigger terpasang. Selanjutnya beban aksial tambahan dari aksi outrigger pada kolom-kolom perimeter cenderung akan mempengaruhi kapasitas kolom pada kondisi kritis. Dalam penelitian ini perilaku
non-linier struktur shearwall-outrigger-belt truss 50 lantai yang didisain tanpa dan dengan faktor pembesar o 2,5 dan modifikasi respon R sebesar 6 sesuai SNI
03-1726-2010 dievaluasi menggunakan analisis non-linier pushover. Hasil penelitian menunjukkan untuk struktur tanpa penggunaan faktor pembesar o mencapai damage index melebihi batas safety limit state yang diakibatkan oleh tercapainya secara dini sendi plastis pada bresing outrigger maupun pada couple beam. Sementara untuk struktur yang menggunakan faktor pembesar o memberikan hasil yang lebih baik namun belum mampu mencapai kinerja struktur sesuai yang ditentukan FEMA 440. Modifikasi dilakukan pada couple beam di lokasi outrigger terpasang menggunakan disain rangka baja untuk memperbaiki
kinerja struktur yang menggunakan faktor pembesar o. Hasil modifikasi memberikan kinerja struktur yang meningkat.
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Outrigger intended to provide rotational restraint at shear wall and external columns stiffened by belt truss are axial bearing components due to the action of
the outrigger. Lee (2008), Taranath (2010), Fawzia (2011) and others shows outrigger can reduce nominal moment of shear wall and building lateral drift. But
the consequences of this outrigger restraints afford additional stresses to the shear wall at the location where outrigger attached. Furthermore additional axial load by outrigger action to the perimeter columns likely would affect the capacity of the column in critical condition. In this study the behaviour of non-linear 50 story shearwall-outrigger-belt truss structure designed with and without magnifying
factor o 2,5 and response modification factor 6 required by SNI 03-1726-2010 evaluated using non-linear pushover analysis. The results showed for the structure
without magnifying factor o reached damage index beyond safety limit state,
caused by plastic hinge formed early at the outrigger bresing and couple beam. As for the structure that uses

a magnifying factor o give better results but have not
been able to achieve the specified performance of the structure in accordance FEMA 440. Modification made to the couple beam at the location where the
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