Modifikasi perencanaan struktur menggunakan Hybrid Composite Precast System dengan sambungan bolted end plate = Design modification using Hybrid Composite Precast System with bolted end plate connection

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Abstrak

Pertumbuhan yang cepat pada sektor konstruksi berakibat pada dibutuhkannya suatu proses konstruksi yang cepat dengan tetap memperhatikan kualitas, waktu, dan biaya. Sebagai suatu inovasi pengembangan dari penggunaan precast concrete structure dilakukan penambahan profile baja dan penggunaan sambungan kering bolted end plate. Inovasi ini disebut sebagai hybrid composite precast systems. Hybrid composite precast system terdiri dari 2 komponen utama yaitu composite precast concrete column dan composite precast concrete beam. Desain elemen komposit mengacu kepada AISC 360-16 dengan memperhatikan compressive strength, shear strength, flexural strength dan kontrol persamaan interaksi. Fluxural strength dicari menggunakan 2 metode yaitu plastic stress distribution dan strain compatibility method. Hasil modifikasi menunjukkan kedua metode memberikan hasil serupa dengan persentase perbedaan 14%. Desain sambungan dilakukan dengan memahami letak garis netral menggunakan diagram interaksi kolom dan strain compatibility method untuk balok. Dari hasil modifikasi berdasarkan hasil analisis manajemen konstruksi ditunjukkan bahwa hybrid composite precast system dapat memberikan waktu ereksi serupa dengan struktur baja eksisting, memberikan penghematan biaya material 23.07% dan biaya akibat fire proofing Rp 43.771.250, serta mengurangi tingkat emisi 25.28%.

.....The rapid growth in the construction sector has resulted in the need for a fast construction process with due regard to quality, time, and cost. As an innovation in the development of the use of precast concrete structures, the addition of a steel profile and the use of dry bolted end plate connections were made. This innovation known as hybrid composite precast systems. The hybrid composite precast system consists of 2 main components, the composite precast concrete column and the composite precast concrete beam. Composite element design refers to AISC 360-16 by taking into account compressive strength, shear strength, flexural strength and control of interaction equations. Fluxural strength was searched using 2 methods, plastic stress distribution and strain compatibility method. The modified results show that both methods give similar results with a percentage difference of 14%. Connection design is done by understanding the location of the neutral line using column interaction diagrams and strain compatibility methods for beam. From the modification results based on the results of the construction management analysis, it is shown that the hybrid composite precast system can provide an erection time similar to the existing steel structure, provides 23.07% material cost savings and costs due to fire proofing of IDR 43,771,250, and reduces emission levels of 25.28%.