

# PERBAANDINGAN DESAIN STRUKTUR DAN BIAYA PC-I GIRDER DAN PC-T GIRDER DENGAN BENTANG 30,8 METER

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## ABSTRAK

Jembatan sendiri diklasifikasikan berdasarkan jenis struktur atasnya, satu jenis struktur atas jembatan adalah menggunakan beton prategang, beton prategang juga dibedakan berdasarkan profil penampangnya yaitu PC-T, PC-I, T Girder, Box Girder, pada penelitian ini dilakukan perbandingan untuk melihat perbedaan struktur atas dan biaya jembatan dengan bentang 30,8 meter pada jembatan Kandai dengan struktur atas eksistingnya menggunakan PC-I Girder dan akan dibandingkan dengan PC-T Girder untuk memperoleh perbedaan perilaku, efektivitas struktur serta biaya. Metode penelitian yang digunakan adalah dimulai dengan mengetahui beberapa rumusan masalah, mengumpulkan data kemudian merencanakan beban rencana untuk jembatan lalu memodelkan pada *software* SAP2000 setelah memodelkan dan mendapatkan gaya dalam selanjutnya dilakukan analisis struktur untuk memeriksa *Safety factor* kemudian dilakukan analisis biaya dan melakukan rekap perbandingan antara PC-I dan PC-T Girder yang berupa perbedaan gaya prategang kondisi awal, nilai kehilangan tegangan, gaya prategang kondisi layan, gaya prategang akhir dan biaya yang disajikan dalam bentuk grafik. Dari hasil analisis perhitungan didapat kesimpulan bahwa PC-I Girder lebih efektif dibanding PC-T Girder, hal ini ditunjukkan oleh nilai volume total beton PC-T Girder yaitu 128,805 m<sup>3</sup> dan jumlah strand PC-T Girder 355 strand, dimana volume total beton PC-I Girder yaitu 101,175 m<sup>3</sup> dan jumlah strand PC-I Girder yaitu 235 strand. Hal ini juga dibuktikan dengan nilai *safety factor* PC-I Girder terhadap momen yaitu 1,141 dan terhadap geser yaitu 3,59 yang sesuai kebutuhan, dibanding dengan *safety factor* PC-T Girder terhadap momen yaitu 3,97 dan terhadap geser yaitu 2,177. Momen nominal yang dihasilkan PC-I Girder yaitu 12203,56 kNm dan momen nominal yang dihasilkan PC-T Girder yaitu 58221,55 kNm. Momen maksimum yang diterima oleh PC-I Girder yaitu 10692,74 kNm dan momen maksimum yang diterima oleh PC-T Girder yaitu 12991,45 kNm, serta biaya lebih besar PC-T Girder dengan harga biaya Rp529,757.151,5 sedangkan PC-I Girder lebih murah dengan harga biaya Rp428.429.486,2

**Kata kunci:** Girder, Momen, *Transfer*, Layan, *Safety factor*, Biaya

# **COMPARISON OF STRUCTURE DESIGN AND COST OF PC-I GIRDER AND PC-T GIRDER WITH SPAN OF 30.8 METERS**

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## **ABSTRACT**

*Bridges are classified based on the type of superstructure, one type of bridge superstructure is using prestressed concrete. Prestressed concrete is also differentiated based on its cross-sectional profile, namely PC-T, PC-I, T Girder, Box Girder. In this study a comparison was made to see the differences in the superstructure and the cost of a bridge with a span of 30.8 meters on the Kandai bridge with the existing superstructure using PC -I Girder and will be compared with PC-T Girder to obtain differences in behavior, structural effectiveness and costs. The research method used is starting with knowing some of the problem formulations, collecting data then planning the load plan for the bridge and then modeling it on the SAP2000 software. After modeling and obtaining internal forces, structural analysis is carried out to check the safety factor. Then a cost analysis was carried out and a comparison was made between the PC-I and PC-T Girder in the form of differences in the initial condition prestressing force, stress loss values, service condition prestressing force, final prestressing force and costs presented in graphical form. From the results of the calculation analysis, it can be concluded that PC-I Girder is more effective than PC-T Girder, this is indicated by the total volume of PC-T Girder concrete which is 128.805 m<sup>3</sup> and the number of strands of PC-T Girder is 355 strands, where the total volume of PC-T Girder concrete is I Girder is 101.175 m<sup>3</sup> and the number of strands of PC-I Girder is 235 strands. This is also evidenced by the PC-I Girder's safety factor for moments, which is 1.141 and for shear, which is 3.59 which is as needed, compared to the PC-T Girder's safety factor for moments, which is 3.97 and for shear, which is 2.177. The nominal moment generated by the PC-I Girder is 12203.56 kNm and the nominal moment generated by the PC-T Girder is 58221.55 kNm. The maximum moment received by the PC-I Girder is 10692.74 kNm and the maximum moment received by the PC-T Girder is 12991.45 kNm, and the cost is greater than the PC-T Girder with a cost price of IDR 529,757,151.5 while PC-I Girder is cheaper with a cost price of IDR 428,429,486.2*

**Keywords:** Girder, Moment, Transfer, Service, Safety factor, Cost