

REDESAIN BANGUNAN GEDUNG TEACHING INDUSTRY LEARNING CENTER (TILC) MENGGUNAKAN RANGKA BAJA KONVENSIONAL (Studi Kasus : Proyek Gedung Sekolah Vokasi Teaching Industry Learning Center (TILC) UGM, Yogyakarta)

Riyan Apriyanto Anggoro^[1] Johan Budianto Kromodiryo, S.T., M.T.^[2]

Program Studi Teknik Sipil Fakultas Sains dan Teknologi Universitas Teknologi Yogyakarta;
e-mail:[1]riyan04apriyanto@gmail.com, [2]johanbudianto@staf.uty.ac.id

ABSTRAK

Redesain gedung Teaching Industry Learning Center UGM delapan lantai dengan baja konvensional dibuat dengan beberapa jenis ukuran baja. Komponen struktur yang diacu meliputi struktur kolom, balok, dan bresing. Penelitian dilakukan untuk mengetahui analisis dan redesain gedung TILC pada komponen balok dan kolom. Jenis baja konvensional menggunakan profil IWF dan H-Beam. Proses pelaksanaan dimulai dari pemilihan jenis baja, dimensi baja, pemodelan dan analisis, hasil pembebanan, kemudian didapat nilai kebutuhan perhitungan dari output gaya-gaya yang dibutuhkan. Gedung TILC didesain ulang menggunakan peraturan SNI 1729-2020. Spesifikasi kolom struktur menggunakan profil IWF (600, 300, 14, 23) mm sedangkan balok induk profil IWF (500, 200, 11, 19) mm. Metode penelitian dengan analisis pada gedung TILC menggunakan bantuan software Structure Analysis Program (SAP2000) Versi 2014. Kategori perencanaan berdasarkan SNI yaitu rangka baja dengan bresing konsentris khusus. Berdasarkan analisis didapat hasil-hasil perhitungan rencana. Pada struktur kolom dan balok menunjukkan penampang kompak, nilai rasio momen kurang sama dengan 1 dan nilai safety factor memenuhi persyaratan. Nilai kontrol lentur kurang dari 1,375 pada kolom dan balok maka memenuhi syarat SNI 1729-2020. Sambungan balok didapatkan jarak antar baut = 80 mm, Ø baut = 15,875 mm, tebal plat = 10 mm, dan jumlah baut = 10 buah. Sambungan kolom badan untuk jarak antar baut = 100 mm, Ø baut = 15,875 mm, tebal plat = 10 mm, dengan jumlah baut = 7 buah serta pada sayap jarak antar baut = 50 mm, Ø baut = 15,875 mm, tebal plat = 10 mm, dan jumlah baut = 7 buah. Nilai simpangan arah x terkecil = 17,21 mm dan terbesar = 26,87 mm. Simpangan arah y, nilai terkecil = 16,04 mm serta = 25,59 mm. Nilai kontrol story drift dengan story drift izin arah x dan arah y didapat hasil sesuai dengan persyaratan.

Kata Kunci : Analisis Gedung; Rangka Baja; Redesain; SAP2000; TILC.

REDESIGN OF TEACHING INDUSTRY LEARNING CENTER (TILC) BUILDING USING CONVENTIONAL STEEL FRAME

(Case Study: Teaching Industry Learning Center (TILC) Vocational School Building Project UGM, Yogyakarta)

Riyan Apriyanto Anggoro[1] Johan Budianto Kromodiryo, S.T., M.T.2]

*Civil Engineering Study Program, Faculty of Science and Technology,
University of Technology Yogyakarta;
e-mail:[1]riyan04apriyanto@gmail.com, [2]johanbudianto@staf.uty.ac.id*

ABSTRACT

The redesign of the eight-story Teaching Industry Learning Center UGM building with conventional steel made with several types of steel sizes. The structural components referred to include the structure of columns, beams, and braces. The study was conducted to determine the analysis and redesign of the TILC building on beam and column components. Conventional steel types use IWF and H-Beam profiles. The implementation process starts from the selection of the type of steel, the dimensions of the steel, modeling and analysis, the loading results, then the calculation requirements are obtained from the output of the required forces. The TILC building was redesigned using SNI 1729-2020 regulations. The structural column specifications use IWF profiles (600, 300, 14, 23) mm while the main beams with IWF profiles (500, 200, 11, 19) mm. The research method with analysis on the TILC building uses the help of the Structure Analysis Program (SAP2000) software version 2014. The planning category is based on SNI, namely steel frames with special concentric braces. Based on the analysis obtained the results of the calculation of the plan. The column and beam structure shows a compact cross section, the moment ratio value is less than 1 and the safety factor value meets the requirements. The flexural control value is less than 1.375 in columns and beams, so it meets the requirements of SNI 1729-2020. The beam connection obtained the distance between bolts = 80 mm, bolts = 15.875 mm, plate thickness = 10 mm, and the number of bolts = 10 pieces. Body column connections for the distance between bolts = 100 mm, bolts = 15.875 mm, plate thickness = 10 mm, with a number of bolts = 7 pieces and on the wings the distance between bolts = 50 mm, bolts = 15.875 mm, plate thickness = 10 mm, and the number of bolts = 7 pieces. The value of the smallest x direction deviation = 17.21 mm and the largest = 26.87 mm. The y-direction deviation, the smallest value = 16.04 mm and = 25.59 mm. The value of story drift control with story drift permissions for x direction and y direction is obtained according to the requirements.

Keywords: Building Analysis; Steel frame; Redesign; SAP2000; TILC.