An Analysis on Design Efficiency Between Castellated Beam and Conventional Beam (Study Case: Workshop Smelter at Tanjung Uncang)

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Abstract

The demand for cheap and strong structure has been a norm for builders especially for steel construction. Steel construction is commonly used in building industrial workshop since it is easy to assemble in a limited time and stronger than concrete in terms of expansive length. Yet, the option of using conventional beam backfires in terms of the cost needed for the construction. This study uses an ongoing construction at Tanjung Uncang for the analysis of design efficiency.

Structural Engineering is exercised on this study. With the given loads and load cases according to SNI 1727-2013, the structural analysis is carried out by using ETABS. The analysis results are used to design the castellated beam according to AISC Castellated and Cellular Beam Design and then analyzing the efficiency between castellated beam and conventional beam.

The cost efficiency of using castellated beam compared to conventional beam in this project is 8.43%. While the volume efficiency of using castellated beam compared to conventional beam in this project is 17.58%. As for the strength ratio of castellated beam B2 and B3 are 0.345 and 0.907 respectively. While as for conventional beam the strength ratio of B2 and B3 are 0.933 and 0.768 respectively. The design of castellated beam on B2 is much stronger than conventional beam, but the design of conventional beam on B3 is much stronger than castellated beam. Although the efficiency on cost is unappealing, castellated beam can be implemented for the installation of MEP works through the opening of the castellated beam.

Keywords: Castellated Beam, Conventional Beam, analysis, design, efficiency