ABSTRACT

Currently, there is an increasing trend of using castellated beams in steel structure, both in industrial and commercial buildings, including their supporting structures. One of the main advantages of using castellated beams is the cost reduction, while at the same time, still meeting the structure safety and serviceability requirements. Web modification of IWF steel beam will produce a new section with bigger 'height (h)' value and interestingly, there is no change in weight. Therefore, the practitioners and building owners will find this as a potential solution to build efficient and good steel structure buildings.

Castellated beam are produced in two hole types, the first being hexagonal, usually called honeycomb, and circular, usually called cell form. Honeycomb is made up of two types: with additional plate in web and without the plate addition. Over the years, castellated beam has played a bigger role in a steel structure building. However, Indonesia uses SNI steel structure codes, which are adapted from AISC – LRFD, and the analysis methods available are only to calculate prismatic structures. IWF beam can directly be calculated by AISC – LRFD, but not for castellated beams. The presence of holes in web part of castellated beam, has made this beam to be categorized as non-prismatic, so the AISC – LRFD method cannot be used directly.

In this thesis, honeycomb's behavior when loaded, its maximum capacity, and how AISC – LRFD can be applied in structural analysis using castellated beam, will be researched and studied. Considering that it is widely used, Honeycomb will be the main subject in this research. Therefore, a number of beam modeling and analysis has been made to obtain a value or an equation which can be used as a reduction factor, so the honeycomb can be calculated directly in steel structure analysis with AISC – LRFD. From the thorough analysis, two equations of third degree polynomial for center point load beam and distributed load beam cases were unveiled.

Keyword : castellated beam, non-prismatic, equation, polynomial, AISC – LRFD