Experimental and theoretical study of large capacity end plate connection

RIHAM REFAAT ABDELSAMIE ABDELHAMED ELHADARY ,Rimon A. Samaan ; Ahmed A. I. El Serwi

Abstract

Over the years, bolted end plate moment connections have been very popular due to the ease of fabrication and erection. The need for large capacity connections with four bolts in one row had become mandatory as a reason of recent complicated structures with large spans and limited available depths. The current research includes an extensive parametric study for the extended large capacity bolted moment connections. For this purpose, three dimensional finite element models are prepared using the non linear, multi purpose, finite element compute package, ANSYS 11.0. In order to validate the developed finite element model, an experimental program containing five full scale flushed and extended, end plate connections subjected to bending moment and shear force is performed. The finite element model used throughout the parametric study is verified by comparing its results with the results of the performed experimental study in addition to experimental results recorded by other researchers showing good agreement. The effect of end plate thickness, bolt diameter as well as adding horizontal stiffener at two different positions on the connection moment capacity and tension bolt force distribution is studied. Several curves are plotted to show the relation between connection ultimate moments and end plate thickness for different connection configurations. Regression analysis is performed for results and design equations were proposed for each connection configuration.

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