Faculty of Engineering
Structural Engineering Department

BEHAVIOR OF FOUR-BOLT-WIDE EXTENDED END-PLATE CONNECTIONS

By
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Structural Eng. Dar Al Handasah

A Thesis
Submitted in Partial Fulfillment for the Requirements
of the Degree of Master of Science
in Civil Engineering (Structural)

Supervised by

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Abstract of the Master of Science Thesis

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Title

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Abstract

Bolted connections have always been the most preferable methods used in field assembly. Although they are commonly used, bolted end-plate connections are extremely complex in their analysis and behavior. Heavily stressed connections may necessitate using wide end-plate connections with more than two bolts in each row. A limited number of experimental and analytical researches have considered such wide connections. Accordingly there are no design equations or recommendations in the common building codes for this type of connection. This research aims to study the behavior of this connection using finite element analysis and provide design equations and recommendations. The finite element modeling technique used in this research has been verified by modeling three experimental research programs with a total number of 20 experiments. The comparison between the finite element model and experimental results obtained a 99% average value with a 10% standard deviation. Five different four bolt wide end-plate connection configuration including two and three rows of bolts have been carried out using finite element analysis under pure bending

moment. Parametric studies are carried out to study the different connection configurations' behavior including the moment-rotation relationship, deformation, prying forces, and bolt force distribution. Finally this research has lead to design equations and recommendations for the four bolt wide end-plate connection that can be useful for national code in order to make use of this type of connection.

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Approval Sheet

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Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Structural Engineering.

The work included in this thesis has been carried out by the author in the period from April 2010 to February 2014.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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