DESIGN REQUIREMENTS OF LATERAL BRACING OF I BEAMS

By

MOHAMED HUSSEIN ABD EL-GHANY ABD EL-AZIZ

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

Master of Science

in

Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

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Under the Supervision of

Prof. Dr. Sherif Ahmed Mourad

.....

Dean of Faculty of Engineering
Professor of Steel Structures
and Bridges
(Cairo University)

Prof. Dr. Sherif Saleh Safar

.....

Professor of Steel Structures
and Bridges
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Approved by the
Examining Committee

Prof. Dr. Sherif Ahmed Mourad, Thesis Main Advisor
Dean of Faculty, Professor of Steel Structures and Bridges
Faculty of Engineering, Cairo University

Prof. Dr. Sherif Saleh Safar, Member
Professor of Steel Structures and Bridges
Faculty of Engineering, Cairo University

Prof. Dr. Hisham Sobhy Sayed Khedr, Internal Examiner
Professor of Steel Structures and Bridges
Faculty of Engineering, Cairo University

Prof. Dr. Ahmed Abdelsalam El-Serwi, External Examiner
Professor of Steel Structures and Bridges
Faculty of Engineering, Ain Shams University

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Engineer's Name: Mohamed Hussein Abd El-Ghany Abd El-Aziz
Date of Birth: 24/08/1981
Nationality: Egyptian
E-mail: Mohamed.Abdelghani@dargroup.com
Phone: 002 01002337510
Address: 252 Saad Ibn Obadah St. 7th district. 6 Oct. City, Egypt

Registration Date: 01/10/2011
Awarding Date: 2015
Degree: Master of Science
Department: Structural Engineering

Supervisors: Prof. Dr. Sherif Ahmed Mourad
Prof. Dr. Sherif Saleh Safar

Examiners: Prof. Dr. Sherif Ahmed Mourad (Thesis main advisor)
Prof. Dr. Sherif Saleh Safar (Member)
Prof. Dr. Hisham Sobhy Sayed Khedr (Internal examiner)
Prof. Dr. Ahmed Abdelsalam El-Serwi (External examiner)
(Faculty of Engineering, Ain Shams University)

Title of Thesis:
Design Requirements of Lateral Bracing of I Beams

Key Words:
Nodal Lateral Bracing, Ideal Stiffness, Inelastic Lateral Torsional Buckling, Local Buckling, AISC 2010 (Appendix 6).

Summary:
A bracing system that causes straight beams to buckle between brace points and to achieve full critical moment capacity is often designated as ideal bracing system. However, the design requirements of beam bracing system stipulated by current codes do not account for the effect of local buckling, yielding, and the ratio of warping to torsion moment resistance of beams. In this work, the effect of the geometric parameters of the beam was investigated by the finite element method using ANSYS. Parametric analysis was conducted on a set of simple beams. It was concluded that: Ideal stiffness of lateral braces decreased when thin flanges were used and/or material yielding was incorporated. Current AISC specifications provided a conservative estimate of lateral braces stiffness. A mathematical model was proposed for ideal stiffness of nodal lateral bracing of beams.

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Dedication

I dedicate this work to
My Parents
who gave my each and every valuable thing in my life. They had the tolerance, wisdom, kindness, decency and enough guidance to put me on the right path all over my life.

I dedicated this work also to
My Lovely Wife Hagar
who supported me to stand up against obstacles with confidence and never despair. She was my inspiration along the way.

May God bless all of them.

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