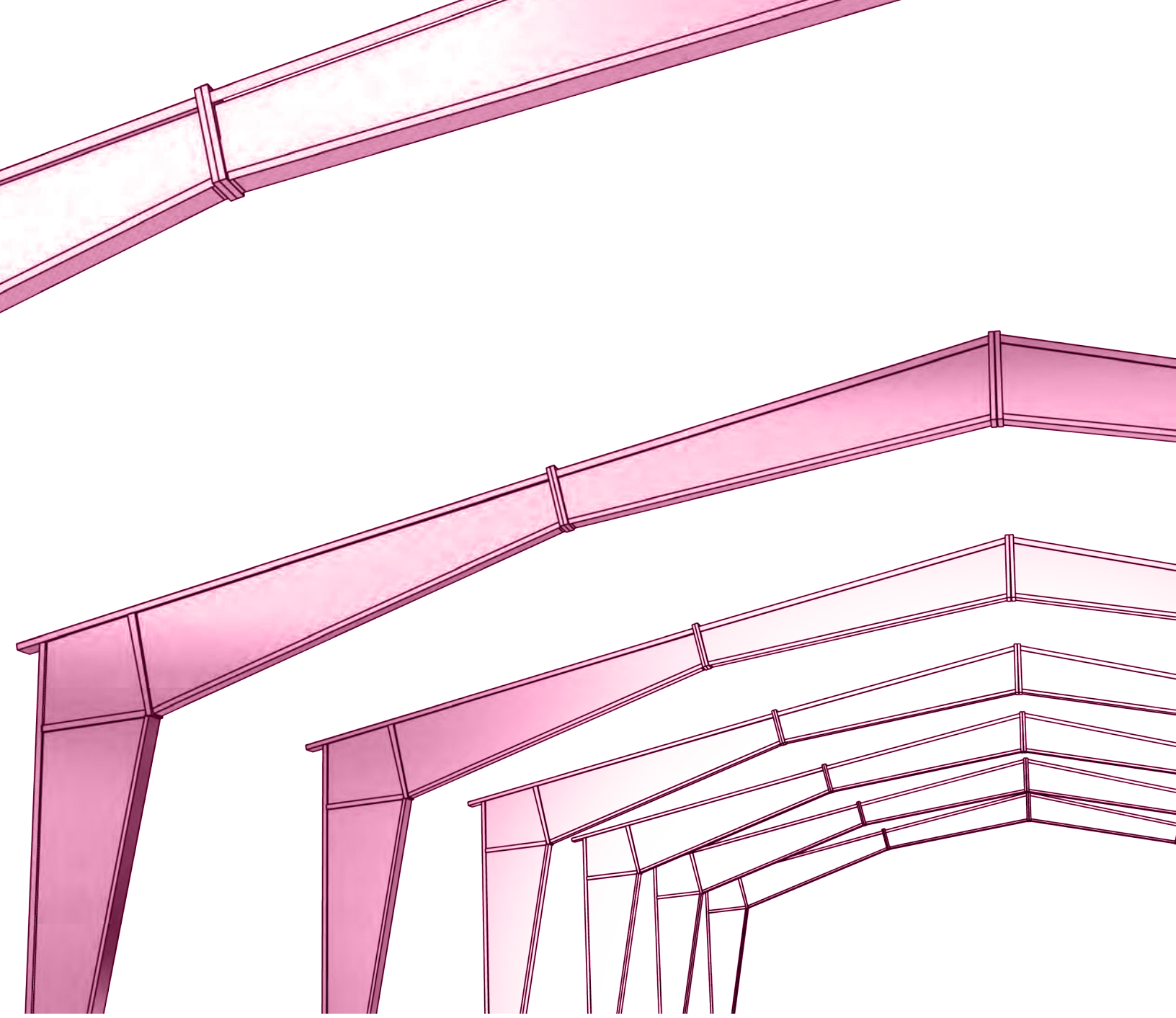

Design Guide 25

Frame Design Using Nonprismatic Members

Second Edition

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Donald W. White, PhD
Woo Yong Jeong, PhD
Ryan Slein

American Institute of Steel Construction

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Authors

Donald W. White, Ph.D., is a Professor at the Georgia Institute of Technology School of Civil and Environmental Engineering, Atlanta, Ga. He is a member of the AISC Committee on Specifications and its task committees on Member Design and Loads, Analysis, and Stability. Dr. White received the T.R. Higgins Lectureship Award in 2009 and the Lifetime Achievement Award in 2018 from AISC for his work in various areas pertaining to design of structural steel members and systems.

Woo Yong Jeong, Ph.D., is a post-doctoral research affiliate at the Georgia Institute of Technology School of Civil and Environmental Engineering and is a Software Developer with Hexagon PPM, Norcross, Ga.

Ryan Slein is a Doctoral Candidate at the Georgia Institute of Technology School of Civil and Environmental Engineering, Atlanta, Ga.

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Dedication

This edition of Design Guide 25 is dedicated to Richard C. Kaehler, who provided quiet and steady friendship and leadership in the development of the first edition of this guide, as well as in numerous technical committee activities for AISC and AISI before his passing in March 2015. It is also dedicated to Dr. Yoon Duk Kim, who contributed greatly to both the first and second editions of this guide, and whose passing came all too soon in May 2018.

Preface

This Design Guide is based on the 2016 AISC *Specification for Structural Steel Buildings*. It provides guidance for the application of the provisions of the AISC *Specification* to the design of nonprismatic I-section members, and frames composed of nonprismatic I-section members. The nonprismatic geometries addressed include web taper and/or any type and number of steps in the cross-section geometry associated with changes in plate dimensions. This Design Guide also addresses varying axial compression along member lengths, such as from intermediate purlin loads on rafters and from crane supports on building columns.

The second edition of this Design Guide (this edition) contains various updates capturing improvements in the design resistance calculations implemented in the 2016 AISC *Specification*. Furthermore, this edition discusses and illustrates the application of refined inelastic buckling analysis procedures for the evaluation of column, beam, and beam-column resistances. In addition, a major focus of this edition is the accurate and economical characterization, within design calculations, of two specific structural stability attributes common to metal building frames: (1) the influence of axial compression in rafters or roof girders, and (2) the influence of leaning column P-Δ effects on the sidesway stability of modular frames—that is, frames in which the roof girders or rafters are supported vertically by light interior columns, subdividing the frame into multiple bays. Four detailed examples are provided illustrating the application of the recommended procedures to different types of metal building frame systems.

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