

Unified Design of Steel Structures, 3rd Edition

Highlights of changes in the book are presented here by chapter. Throughout, the use of *Specification* and *Manual* equation numbers has been implemented to assist the reader in navigating the *Specification* and *Manual*. Also, all examples have been revised to provide the actual equations being used prior to entering the numbers for the calculations.

Chapter 1 includes an expanded discussion of structural integrity along with a discussion of the timing of adoption of the new provisions into the International Building Code. The integrated project introduced in this chapter for use throughout the book has been relocated to a new city from the 2nd edition and the framing system modified. This will provide new homework options for those who have implemented this project. A computer model using the RAM Structural System will be available on the book website to support inclusion of the integrated project in courses. Finally, an expanded discussion of reliability and statistics as it applies to structural steel design has been included.

Chapter 2 provides an expanded discussion of snow, wind and seismic loads and additional calculations for these environmental loads using ASCE 7.

Chapter 3 discusses the new steels approved by the 2016 *Specification* and the new approach taken by ASTM to the specification of high strength bolts.

Chapter 4 addresses tension members. The provisions have not changed, but there has been a revision in standard hole sizes for bolts. These new sizes have been implemented in the examples where appropriate.

Chapter 5 looks at compression members, and the *Specification* nomenclature change of KL to L_c has been implemented. A section and an example have been added to address gravity-only columns and their influence on the effective length of columns in lateral load resisting systems. The completely new approach for treatment of columns with slender elements, introduced with the 2016 *Specification*, is addressed. Single angle compression members and built-up compression members are discussed and examples provided.

Chapter 6 on flexural members includes a discussion of the shape factor and its significance. The use of *Manual* Table 3-10, the beam curves, with C_b not equal to 1.0, is expanded and a new example is included to illustrate the use of *Manual* Table 3-2, the economy tables, for noncompact beams. The treatment of tees, single angles and double angle beams has been expanded and examples included. Determination of shear strength for wide-flange members when the reduced resistance factor or increased safety factor must be used is now illustrated.

Chapter 7 addresses plate girders as doubly symmetric I-shapes built up from plates. It now includes a discussion of these plate girders with compact webs. The completely revised treatment of shear in plate girders included in the 2016 *Specification* has been incorporated, and the corresponding stiffener design has been expanded.

Chapter 8 has an extensively expanded discussion of stability analysis and design including comparisons between the direct analysis method, the effective length method and the first order analysis method. The discussion of beam column design has been revised to reflect the changes in *Manual* Part 6, and an example of interaction of tension and bending is included.

Chapter 9 now includes a discussion of partial composite action, recognizing the concern expressed in the *Specification* with low levels of partial composite action and the corresponding ductility demand. Emphasis is given to the plastic neutral axis locations in *Manual* Table 3-19 and the corresponding percent of composite action. Composite column discussion is expanded to include examples for composite HSS.

Chapter 10 has added discussions of the new ASTM bolt specifications and the new high strength Group C bolts. A discussion of bolt installation has been included. The new interpretation of the controlling bolt limit states is discussed, and examples have been revised to reflect this new approach. Slip-critical bolts in combined shear and tension are now addressed. The discussion of weld strength when loaded at an angle and strength at the base metal has been expanded.

Chapter 11 has been revised to account for the new interpretation of the controlling bolt limit states.

Chapter 12 continues to address moment connections and reflects the changes in controlling bolt limit states as applicable.

Chapter 13 continues to outline the application of the *Seismic Provisions*.

Throughout the book, new figures are included to better illustrate the corresponding material. Homework problems have been revised and expanded, and the worked solutions have been revisited.