

## Unified Design of Steel Structures, 4<sup>th</sup> edition

**Example Problems for ANSI/AISC 360-22:** Examples have been updated to the new specification and the new table of member properties, as well as being revised to improve clarity of intent. In addition, selected examples that had used A36 material have been changed to use material with  $F_y = 50$  ksi to be consistent with similar changes in the *Manual*.

**New Homework Problems:** Over 110 homework problems have been added and 180 have been revised. This edition provides over 570 homework problems intended to provide meaningful activities for student learning. Problems continue to be included that carry over from one chapter to another so that an opportunity exists to link concepts of design to one or two specific structures.

The following addresses changes to be found in each chapter:

**Chapter 1** includes updated references to new and revised Design Guides, an expanded discussion of the benefits of student membership in AISC, and reference to Volume 2 of the Companion to the AISC *Steel Construction Manual*. It also includes discussion of AISC 303-22, the *Code of Standard Practice*. The presentation of reliability analysis, the foundation of the *Specification*, has also been revised.

**Chapter 2** contains a new section on reliability and probability of failure. Graphs are provided to illustrate how these two indicators of safety are different for ASD and LRFD and how different load combinations lead to different levels of reliability. The relationship between reliability and probability of failure is also explained. To support these calculations, statistical data are presented for several load types. Additionally, several examples have been revised to include calculation of loads that include roof loads.

**Chapter 3** discusses the changes in preferred materials and provides updates on those material specifications that have been revised.

**Chapter 4** addresses tension members. As was the case for the 3<sup>rd</sup> edition of this book, the provisions have not changed. However, it has been clarified that when holes are discussed, they are understood to be bolt holes. Examples have been revised to be for 50 ksi material, consistent with the preferred materials discussed in Chapter 3. The limit states that control the strength of pin connected members are expanded upon.

**Chapter 5** addresses compression members. The terminology change in the *Specification* where nominal stress is now used in place of critical stress is reflected throughout the chapter. The limitation on “as fabricated” slenderness is discussed. The change from 36 to 50 ksi material as the preferred material for angles results in a need to confirm which provisions apply that might not have applied for earlier designs. A new example is added to address constrained axis torsional buckling.

**Chapter 6** on bending members includes a change in how the most economical member is selected when using *Manual* Table 3-10. This is illustrated in examples for beams with unbraced length. In addition, more attention is given to dealing with the self-weight of members throughout the examples.

**Chapter 7** addresses plate girders and contains a new section on proportioning of those plate girders. The discussion of tension field action in end panels is expanded and reference is made to the shear design aids in the *Manual*.

**Chapter 8** on combined compression and bending includes a somewhat expanded discussion of the various methods of stability analysis and design. The section on initial trial member selection is expanded to address shapes deeper than W14 and reference is added to a more refined approach found in the literature.

**Chapter 9** examples addressing composite design have been adjusted to match the tables in the 16<sup>th</sup> edition *Manual*. In addition, guidance is provided for selection of camber for composite beams.

**Chapter 10** has been revised to be consistent with new bolt group designations based on bolt strength and all examples similarly revised. The directional strength increase for welds has been expanded and the weld sizes in several examples have been changed to more realistic sizes.

**Chapter 11** now includes direction for locating connection design examples beyond those presented here. The chapter has been revised throughout to provide additional clarity in discussion and examples. Many examples have been revised to use 50 ksi preferred materials. Discussion of eccentricity on welds, single angles and shear tabs is expanded. Derivation of the prying action equations have been expanded.

**Chapter 12** continues to address moment connections and has had examples revised to incorporate 50 ksi connecting elements, reflecting the revised preferred materials presented in the *Manual*. As result, examples have been modified to describe the new limit states that will now control.

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

Throughout the book, new figures are included, and others revised, to better illustrate the corresponding material.