steelwise

REQUIRED READING

BY MARTIN ANDERSON

A collection of valuable engineering resources, some familiar and some perhaps not, which the Steel Solutions Center consults in answering your technical questions.

OVER THE LAST DECADE, the AISC Steel Solutions Center has answered more than 100,000 questions, making use of innumerable references and resources in the process.

While many of these sources are very recognizable, others are perhaps not as well-known as they deserve to be, so we've compiled a list of those we find the most interesting and useful to structural engineers. Some of them may not need to be consulted every day, but they likely will come in handy sooner or later.

AISC Commentary. It's right there in front of you—if you happen to be looking at an AISC document. Many times, the answer to a question can be found in the document itself or, more specifically, in the Commentary that AISC includes with documents like the AISC *Specification* and *Code of Standard Practice*. Commentaries in AISC standards contain extensive sections with background information and references intended to provide a fuller understanding of their various requirements. The Commentary is not normative but rather is included for information only. In the AISC *Specification* and AISC *Seismic Provisions*, Commentary pages can be identified by the vertical gray stripe at the edge of the page. In the *Code of Standard Practice*, the Commentary is presented in-line with the main text in gray boxes.

AISC Design Guides. Recognizing the wide range of projects that design professionals are called upon to handle, AISC has produced a number of design guides to help the practicing engineer. The design guides are intended to be informational, not normative, and as such compile and organize the thoughts and suggestions of their authors on particular topics. For example, *Steel Design Guide No. 1* deals with the complexities of base plate and anchor rod design, including practical tips on how to handle common problems. *Steel Design Guide No. 24* covers HSS connections in detail. The full list of topics covered is available at www.aisc.org/dg. All design guides are free in digital form to AISC members; nonmembers may purchase them.

ASME BTH-1 and B30.20. AISC provisions for design of pins are intended to apply to pin-connected members in buildings (such as found in trusses) and not lifting hardware. However, the American Society of Mechanical Engineers (www.asme.org) publishes BTH-1, which covers the design of below-the-hook lifting devices, as well as B30.20, which includes provisions that apply to the marking, construction, installation, inspection, testing, maintenance and operation of those devices.

ASTM DS67C. There are innumerable steel materials standards in the world and while no summary can replace the close reading of a standard, you may still find it useful to have a broad summary to give you a general idea of what another material standard requires. ASTM, home of more standards than you or I can count (www.astm.org), also publishes the *Handbook of Comparative World Steel Standards*, which covers 6,000 steel materials standards.

Guide to Stability Design Criteria for Metal Structures. The definitive work on design for stability, this text is presently in the sixth edition and has grown to span over a thousand pages of detailed information on stability, with the current edition having significant revisions in a number of areas. Although no new chapters were added for the sixth edition, this latest version from the Structural Stability Research Council (www.stabilitycouncil.org) improves upon the information in previous versions.

Industrial Fasteners Institute. Need to calculate the required thread engagement for a specialty threaded item? Consult the Industrial Fasteners Institute (www.indfast.org). When it comes to the design of threaded fastener components other than the structural bolts that are commonly used in building design and construction, if you follow the chain of references and standards you'll end up here at some point. IFI's technical publications also do a good job of conveying the knowledge and concerns of fastener manufacturers, which can help guide structural engineers who seek to address a less common case of fastener usage. One example is the IFI technical bulletin on calculating thread strength. This is taken care of for us in the fasteners assemblies we use in typical structural bolting applications but may require consideration in specialty applications, like installing a bolt in a tapped plate.

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Manufacturers. When you have questions about a manufactured part, always consider asking the manufacturer! Many companies have detailed technical specifications available to help design professionals that use their products. Their technical representatives also can be a wealth of knowledge and experience about their product.

Materials Handling Industry. The MHI (**www.mhi.org**) is an umbrella organization with a number of subgroups covering all areas of materials handling, ranging from AS-RS (automated storage and retrieval systems) to SCESTG (supply chain execution software). Some of the most commonly referenced standards in our segment of interest are Crane Manufacturers Association (**www.mhi.org/cmaa**) documents, especially CMAA 70 for single-girder cranes and CMAA 74 for multiple-girder cranes. They also have a number of other items you may find interesting or useful, such as ANSI MH 16.1 *Specification for Industrial Steel Storage Racks*.

NAAMM. Stairs, gratings, flagpoles, railings and other miscellaneous metals are covered by the National Association of Architectural Metal Manufacturers (**www.naamm.org**). This group represents a wide variety of metal products for building construction and is presently working on a revamp of their stair design manual. NAAMM has six divisions, each promoting the use of specific products through the development and distribution of technical standards; the AMP group, for example, is currently working on a stair manual.

NEPCOAT QPL. We're sometimes asked whether a particular paint is rated to provide the slip resistance coefficient needed for a slip-critical joint design. The North East Protective Coating Committee (**www.nepcoat.org**) is an organization that maintains a list of qualified products for both existing and previously painted existing steel bridges, as well as new and 100% bare existing steel bridges, with tested slip coefficients given for many of the listed paint combinations.

The Ricker Articles. David T. Ricker was a wise and knowledgeable engineer respected by all who knew him. He often shared his knowledge at AISC meetings and events and also wrote several papers that were published in AISC's *Engineering Journal*. All of these papers focus on practical matters of concern to the practicing structural engineer and many are considered to be classic references that still help today in spite of their age. They can be downloaded from **www.aisc.org/ej**; scroll down to the search form, put "Ricker" (no quotes) in the Author field, leave all of the other search fields blank and click Search. *Engineering Journal* articles are free to members of AISC and may be purchased electronically by others.

SSINA. The Specialty Steel Industry of North America (**www.ssina.com**) is a trade association representing virtually all the producers of specialty steel in North America. It offers an abundance of information on stainless steel, including the *Stainless Steel for Structural Applications Designer Handbook*, a list of common sizes for various shapes, information on the various types of stainless fasteners and similar resources.

SSPC VIS. The Society for Protective Coatings (**www.sspc.org**), formerly the Steel Structures Painting Council, was originally founded in 1950. In 1997 their name was changed to better reflect the scope of their membership and the expansion of coatings technology, though they retained the SSPC acronym. For our purposes, some of the most valuable but least-known information that the SSPC provides is the "VIS" series of documents, which are a set of guides with reference photographs.

On that topic, several times a year we're asked whatever happened to our old "American Rust Standard" book. As it happens, that document was never published by AISC but instead by a different organization—the American Institute for Steel Classification—which no longer exists, and the book hasn't been in print for decades now. The modern equivalent of the old rust guide is SSPC VIS-2 *Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces*, which can be purchased as a convenient laminated spiral-bound "flipbook" publication.

Additional Reading

Structural engineering is blessed with a huge number of "classic" texts on almost any conceivable topic. While we cannot possibly focus on, or even list, any sizeable percentage of them, there are four that keep popping up in technical inquiries and that we believe you may find useful in a variety of circumstances:

- *Design of Welded Structures* by Omer W. Blodgett. This book is published by and available from The Lincoln Electric Company (**www.lincolnelectric.com**).
- *Guide to Design Criteria for Bolted and Riveted Joints*, 2nd Edition, by Geoffrey L. Kulak, John W. Fisher, John H. A. Struik. This publication is available as a free PDF from the Research Council on Structural Connections at **www.boltcouncil.org**.
- *Roark's Formulas for Stress and Strain*, 8th Edition, by Warren Young, Richard Budynas, Ali Sadegh.
- *The Theory of Plates and Shells* (reissue) by S. Timoshenko.

(These last two can be found at **www.amazon.com** and sometimes at **www.ebay.com**.)

This list is by no means all-inclusive and if you have your own favorite resources, let everyone know via Twitter. You can Tweet us **@AISC** using the #steelref hashtag.

Good luck in your search for answers and as always, you can contact the Steel Solutions Center at **solutions@aisc.org** or 866.ASK.AISC, or visit **www.aisc.org/solutions**. MSC