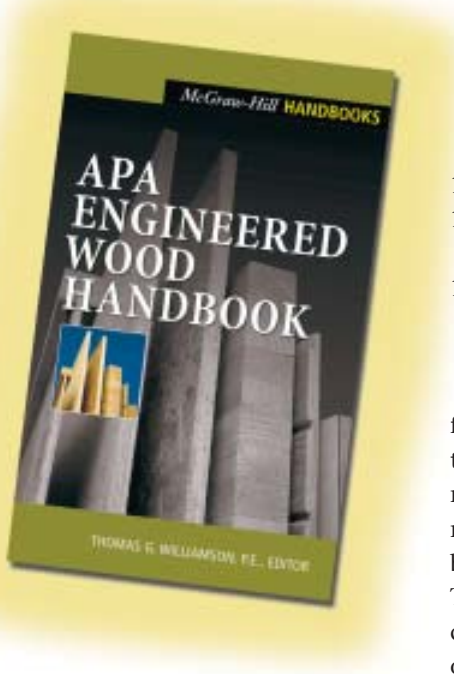
Designing With Engineered Wood

by Paul Fisette

For more than 50 years, and in several organizational forms, APA–The Engineered Wood Association has provided technical leadership in the manufacture and use of structural wood composites. During this period, APA has published countless technical directives for a host of wood composites, including plywood, OSB, glue-laminated beams, laminated veneer lumber, and, most recently, wood I-joists. APA has now synthesized this wealth of information into a handy compendium. *The APA Engineered Wood Handbook* edited by Thomas G. Williamson, P.E. (McGraw-Hill, 2002; 800/722-4726, www.construction.com; $115) is a solid reference tool prepared by the Technical Services staff of APA.

I have to warn you, though: This chunk of a book is dry. How dry is it? Let's just say that within ten minutes of opening it, I thought the relative humidity in my office had dropped 60%! But in all fairness, no one purchasing this book is looking for an ocean of fun. The style will be familiar to anyone who has used APA product guides and standards; it's technically comprehensive and rich with hundreds of useful illustrations and tables. At 750 pages, it's meaty, but the 6-by-9-by-3-inch shape is easy to hold. At first, I was concerned that the thick profile would be awkward to use, but, with a little coaxing, the hardcover book remains open on your desk while you work with a computer or calculator.

The handbook is nicely organized into 12 chapters that provide a variety of information. Although much of it is basic and helpful to practitioners, the dialogue extends far and delivers an abundance of complex design guidelines required only by engineers. For example, the handbook clearly describes various panel products and explains how they're used, with specific advice for handling materials and protecting yourself. Fastener schedules are provided, and tables and figures generously illustrate application details. Grade stamps are explained, and appropriate spans for a broad range of installations are recommended.



But then, exit designer wanna-bes and enter professional engineers. The level of complexity turns to a discussion of mechanical properties. This is heavy stuff — you could easily pull a muscle reading page upon page about capacities, adjustment factors, and allowable stress and strain. All this leads to a set of complicated design examples where engineers get to practice a multipage calculation or two.

The treatment is generally consistent and appropriate, chapter to chapter. Builders, specifiers, designers, and engineers all get what they need in a functional format, as seen in the chapter listing:

1. Introduction to Wood as an Engineering Material
2. Wood Structural Panels
3. Wood Structural Panels in Structural Components
4. Structural Glued Laminated Timber
5. Prefabricated Wood I-Joists and Engineered Rim Board
6. Structural Composite Lumber
7. Designing for Lateral Loads
8. Mechanical Fasteners and Connections
9. Treatments and Finishes for Wood
10. Fire- and Noise-Rated Systems
11. Fiber-Reinforced Polymer (FRP)–Wood Hybrid
12. Designing and Detailing for Permanence

There are a few soft spots in this fruit. The page-numbering scheme takes a little getting used to. Pages are numbered in a "chapter.page" format, and chapter sections are numbered using the same system. Therefore, you'll find installation details for roof I-joists in section 5.10 on page 5.96. I quibble, but this gets a bit confusing when you're looking for cross-referenced topics.

There is no single performance standard for wood I-joists like there is for plywood and OSB (oriented-strand board). APA is trying to standardize the I-joist industry, but it's a battle. Most manufacturers fear that standardization will convert I-joists into a low-value commodity product like lumber. As a result, APA certifies just 25% of the wood I-joists made. This means that whenever you use engineered I-joists, rim boards, or other proprietary materials, you have to use the specific manufacturer's guidelines, not this handbook. This devalues information like that found

in Chapter 5 to general interest.

My last criticism of this book involves topic selection. The chapters "Fire- and Noise-Rated Systems" and "Designing and Detailing for Permanence" are up to date and relevant to good building practice, but they don't deal with engineered wood. On the other hand, you might expect engineered wood products like machine-stress-rated lumber, open-web joists, and roof trusses to be covered, but they're not. These topics seem more appropriate and should be included.

Overall, the publication is well balanced, providing a good introduction to each topic. Practical discussions introduce more complicated, analytical sections in a logical sequence. A complete and useful index leads readers smartly to specific topics.

The *APA Engineered Wood Handbook* consolidates a pile of design guidelines under one cover. It's well done, fills a niche, and is useful for residential and nonresidential building construction. Although the book is most helpful to structural engineers, it's also of value to serious builders and material suppliers who want a handy reference for structural wood composites.

Paul Fisette *is director of Building Materials and Wood Technology at the University of Massachusetts at Amherst.*