

Knock on wood: Real recycling opportunities are opening up

by Preston Horne-Brine and Robert Falk, Ph.D.

The development of grade standards for recycled timber and lumber will aid in reclaiming the value of wood.



Recycled wood represents a value-added opportunity with tremendous potential for use in a massive market – that of lumber. As it comes of age, the recovered timber and lumber industry is positioned for strong growth, kicked off by recent efforts to develop industry standards.

Six major factors set the stage for the recovered timber industry to take off in a big way:

■ **A large market exists.** The North American construction industry is huge, consuming over 60 billion board feet of lumber per year. This industry has been going full bore for much of the '90s. Single-family home-building is steaming along at the fastest pace of the last decade, and current lumber pricing remains at the higher end of the five-year range (nearly \$400 per 1,000 board feet).

■ **Wood recycling is happening already.** Within this broad lumber market, strong niches have been carved out for recycled wood products in recent years. Demand has been stimulated because of the “sustainable development,” “green building” and “sustainably harvested wood” trends.

In many communities, very-high-value but very-small-volume niche markets exist for timbers and milled products.

■ **Reclaimed wood has performance advantages.** Wood available in older buildings has many benefits. Much of the virgin lumber on the market today is from second- and third-growth forests that were grown faster and harvested earlier than the old-growth wood that can be reclaimed from older structures. Many candidates for demolition were built with lumber and timbers considered oversized by today's standards. Some reclaimed timbers are available in sizes (cross sectional and lengths) that are not available in virgin timbers.

In addition, reclaimed lumber contains dense, tight-grain wood; is often remarkably free of knots and defects; and is dry and therefore dimensionally stable.

■ **The supply is vast.** Since the turn of the century, over three trillion board feet of

lumber and timber have been sawn in the U.S., much of it still standing in existing structures. If only 2 percent of wood buildings now standing were decommissioned each year, and 25 percent of the lumber in them were reclaimed, it would supply up to one-fourth of the overall lumber market in this country for over 50 years.

■ **The recovery infrastructure is increasing.** The demolition industry is large and well established. Until recently, it downplayed materials recovery, but now is undergoing a reorientation toward recovery, reclamation and sale of concrete, metal, wood, timbers and other materials.

In addition to demolition contractors, a new sector—the deconstruction industry—has grown steadily. The deconstruction business always has existed, but at a small scale. And, it primarily was involved in recovering hardware and specialty millwork from old buildings in

Preston Horne-Brine is President of Fluxion Enterprises and a Senior Associate at ReSourcing Associates (both of Seattle). Robert Falk, Ph.D. is a Research Engineer for the U.S. Forest Products Laboratory (Madison, Wisconsin).

select situations. It now is ballooning into a mainstream industry that can salvage a far higher percentage of materials in old buildings.

Also, the new-construction and remodeling sectors have expanded their capacity to recover material and to reuse them in new construction.

- **Markets are improving.** Numerous recycled wood markets are being developed (for example, see "High-value Markets for Deconstruction Wood" in the August 1998 issue of this magazine). Several of these markets are of particular importance. A number of independent lumber mills, experiencing difficulty in the last 10 years in sourcing logs, have retooled their operations to process reclaimed timbers and essentially have reinvented themselves. Creative mills have developed glue composite fabrication, fingerjointing and veneer lamination techniques to eliminate defects, enhance the value of individual pieces, and fabricate specialty shapes. In addition to the milled-timber market, some companies have discovered that small solid-wood recycled pieces can be used feasibly. A reclaim operation sources recycled wood and processes it to billets and blanks of specific size, species and qual-

ity. These then are supplied to a production plant making an engineered, prefabricated product, such as furniture, fixtures and flooring.

Moving forward

All this activity is not to suggest that reclaimed wood is without problems, particularly in the area of aesthetics. However, strategies are being developed to address such concerns.

In the open, price-competitive lumber market, much more work must be done to validate recycled wood products. Performance testing must be conducted and standards established to provide necessary market assurances. Grade standards will not only provide assurance as to structural integrity, but also are necessary for market acceptance and penetration of the commodity lumber market.

This is especially true for the largest undeveloped market for recovered wood: remilled or finger-jointed dimensional lumber, primarily in two-inch sizes. Tremendous potential exists to use reclaimed lumber again, as structural framing in new construction and remodeling. To date, however, it has remained the smallest segment of the reclaimed wood market and a minuscule segment of the overall lumber market.

Fundamental barriers remain to consumer acceptance and widespread penetration of the dimensional-lumber market at volume levels that are significant. They are:

- **Recognized assurance.** The minimum quality of grades of recycled wood products needs to be assured.
- **Cost.** Lumber is a commodity, with a fiercely competitive market in which low prices often prevail. In this market, reclaimed wood still is too expensive.
- **Inefficient distribution.** Recovered lumber markets must compete against the highly efficient distribution system established for virgin lumber, with the prevalence of very large building-products suppliers, numerous large big-box building-product retailers (such as Home Depot) and thousands of local lumberyards. This supply network does not work very well for recycled lumber because it requires grade-stamp assurances, tends to work on a very-large order basis, and is very sensitive to traditional contractor perceptions of product quality.
- **Insufficiently developed recovery standards.** Deconstruction and demolition specialists lack the necessary knowledge to optimize their reclamation efforts. They need to know which specific reuse markets are available to them, what each

market specification is, how to estimate recovered lumber value accurately in their bids, and how to utilize various recovery options to maximize yield and value.

Grading standards are needed

The lack of grading standards for reclaimed lumber products is a primary obstacle to expanded trade. Such standards include grading rules, engineering properties and a grade stamp. Creation of acceptable grading standards and a stamp for recycled wood will provide the confidence and product assurance that will allow lumber and timbers to move readily through distribution channels to market, and then through the permitting and construction process. It will significantly expand the value, volume and types of recycled wood that flows through the system. Recovery operators will have much clearer product specifications and will be able to optimize their operations. Overall unit costs will come down, while acceptance of this product by designers, builders, inspectors and consumers will rise.

Why not use existing grading standards?

Recycled timbers currently are graded according to the same criteria as virgin timbers. Existing grading rules, which were developed for virgin wood, often do not consider, or sometimes disallow, defects commonly found in recycled wood. It is not clear that these reclaimed defects, while visually apparent, significantly affect wood structural properties. As a result, much recycled timber or lumber is downgraded or disallowed.

Moreover, a grade stamp allows each piece to be sold individually. Using existing rules to grade recycled lumber typically requires that a grading certificate be issued for each batch of graded material. This certificate limits the sale of the entire batch of that lumber to a single order, a highly restrictive situation.

What needs to happen

If rational grading criteria are to be developed, the following three tasks must be accomplished:

Rules need development. Although existing grading rules can be used, they do not reflect a technical understanding of recycled wood, its particular advantages and its common defects. Rules specific to recycled wood are needed.

Engineering properties need to be determined. The grading criteria for the new rules must be based upon technical research that substantiates the effect of age, exposure and defects upon the structural integrity and performance of recycled lumber and timbers. This can be determined only by experimental testing and analytical modeling.

A new grade stamp must be approved.

Efforts will be required to make the grading stamp an industry standard.

The work is underway

Technical performance testing on recovered material must be performed, and reclamation protocols must be developed.

Testing has been conducted at the U.S. Forest Products Laboratory (Madison, Wisconsin) over the last five years, with support from a wide assortment of interested parties. Reclaimed wood has been tested for struc-

tural integrity in the presence of checks, splits, and bolt and nail holes. Larger timbers and smaller lumber have been tested. The results have been positive and are adding to the accumulated body of data on recycled wood characteristics and performance in various applications.

Additional research needed

A first attempt at gaining approval for a recycled wood grading stamp was made in late 1998 based on experimental and analytical

test results with large timbers.

Working with a variety of parties, the West Coast Lumber Inspection Bureau (Tigard, Oregon) proposed a change in grading rules to the American Lumber Standards Committee Board of Review. The board deferred action in October 1998, citing the overall lack of data on the engineering performance of recycled lumber and timber.

In response, a major research effort is underway, directed by the Forest Products Laboratory. It is funded under a White House initiative called Partnership for Advancing Technologies in Housing and is administered, in part, by the U.S. Department of Housing and Urban Development (Washington). It entails securing, selecting and transporting reclaimed lumber samples from a broad base of sites across the country, with a focus on two-inch lumber from urban and military deconstruction projects. This material will be graded by existing rules to set a baseline. The recovered material will undergo extensive testing and modeling according to established industry procedures. The data will be analyzed to substantiate recommendations on the engineering properties of reclaimed lumber and facilitate development of grading rules, reuse options and recovery protocols, including a field manual for graders and deconstruction and demolition specialists.

This collaborative, federally funded program will be coordinated with ongoing or planned deconstruction projects around the country over the next several years.

No wooden nickels here

With the completion of this new study, grade stamps for recycled lumber and reclaimed timber may be approved. For this to happen, the testing results will need to be positive, and industry players will have to agree on the appropriate role that recycled wood products then will play in this large and competitive marketplace. **RR**