Exploring Value-Added Options

by Bob Smith and Phil Araman

(Editor's note: Faculty at the Center for Forest Products Marketing at Virginia Polytechnic Institute and State University are taking a look at a variety of value-added options for today's forest products industry. Bob Smith is an assistant professor and extension specialist at Virginia Tech; Phil Araman is project leader for the USDA Forest Service Southern Research Station located at Virginia Tech.)

EDGE-GLUED PANELS AND BLANKS OFFER VALUE-ADDED OPPORTUNITIES

As sawmills search for new opportunities to add value to rough sawn lumber, many consider producing dimension parts as one solution. Assembling dimension parts into edge-glued panels or standard blanks can add even further value. Blanks are defined as pieces of solid wood (which may be edge-glued) that are manufactured to a predetermined size.

Secondary manufacturers can further process these blanks into specific products such as furniture or cabinet parts. Typical uses for edge-glued panels (blanks) include table tops, drawer fronts, upholstered furniture frames, cabinet fronts, and shelving products.

Another important market for blanks and edge-glued panels is the export market. International firms are increasing their use of panels and blanks as lumber prices increase and as their processing costs go up. In 1995 it was estimated that over 16 percent of dimension products were further manufactured into edge-glued panels. For the sawmill, edge-glued panels (blanks) can offer better recovery from lower grade material and an opportunity to utilize short-length lumber.

Edge-glued panels (blanks) utilize kiln dried lumber that has less than a seven percent moisture content. The lumber is processed in a rough mill. Generally it is planed to a nominal 4/4" or 5/4" thickness and cross-cut first to gain the longest possible clear cuttings. Random width cuttings are then ripped from the cut-to-length boards. Shorter clear boards are salvaged by further cross-cutting to eliminate defects.

Typical rough mill yields average between 55 to 65 percent. Clear cuttings are then matched for color and grain patterns, put into panel sets, and edge-glued. Once the glue is cured, the panels are planed to the final required thickness. Although the cross-cut first roughmill is common, there has been increased interest in a rip-first roughmill in recent years. The USDA Forest Service in Princeton, West Virginia, has a computer yield program (ROMI-RIP) available to assist manufacturers who are interested in a rip-first operation. The organization is currently developing a companion cross-cut first yield program.

Machinery needed to manufacture edge-glued panels includes cross-cut saws, planers, ripsaws, and clamp carriers for the gluing operation. Gluing may be manual or automatic. A manual gluing station will use two to three people with a glue reel and produce two to four MBF a day. A rough mill requires a large area for storage and work-in-progress, while an edge-glued panel operation also requires material handling equipment.

The most common species used for edge-glued panels include red and white oak, hard and soft maple, poplar, cherry, ash, white pine, and

Southern yellow pine. Some common size blanks are 4/4" thick, 18-26" wide and range in length from 15" to 100". The Wood Component Manufacturers Association has established standard rules and specifications for dimension and woodwork. The organization's rulebook covers tolerance, grading, inspection procedures, and machining.

One of the most important aspects of edge-glued panel manufacturing is proper color matching of the individual pieces composing a panel. The color matching process is difficult, quite labor intensive, and time consuming, but increases the quality and value of the panels. Because individual workers have different perceptions of color shades and uniformity, it is difficult to maintain a consistent uniform color in the edge-glued panel.

Recent research in Virginia Tech's department of wood science and forest products, in cooperation with the USDA Forest Service Research at Virginia Tech and NOVA Technologies of Charlotte, North Carolina, has developed an automatic color sorting system for hardwood edge-glued panel parts. The system uses high speed color line cameras to scan both sides of each part. Data from each camera is processed on a personal computer and each seamed part is assigned a color class and marked with the best face.

Associations involved with this market include the Wood Component Manufacturers Association in Marietta, Georgia, and the Wood Products Manufacturers Association in Westminster, Massachusetts. Information on the color matching system and ROMI-RIP program can be attained from the USDA Forest Service Northeastern Forest Experiment Station in Princeton, West Virginia (phone 540/231-5341).

Edge-glued panels and blanks offer sawmills another opportunity to add value to rough lumber. As with all new product possibilities, the sawmill must determine the needs of its customers first. The tolerances and quality expected of finished panels are much higher than those of rough sawn lumber. Panels for the export market may require different specifications than for the domestic market. However, mills can earn higher profits as well as utilize shorter lengths and lower grades of lumber by successfully serving this market. As outsourcing becomes more common in the furniture and cabinet industries, sawmills that manufacture quality edge-glued panels and blanks will find broader markets for their products.

OPPORTUNITIES IN MOULDINGS AND MILL WORK

The millwork industry, which includes the manufacture of doors, windows, stair parts, blinds, mouldings, picture frame material, and assorted trim, can be a lucrative value-added opportunity for sawmills. Those entering the value-added millwork market often find that it is a great opportunity to generate greater profits from upper grades and utility species, such as yellow poplar. In the past, approximately 75 percent of mouldings and millwork were made from softwoods, while the rest were made from hardwoods. However, this picture has been changing due to old-growth harvesting restrictions in the Pacific Northwest. More and more opportunities are being created for Eastern hardwoods.

The predominant millwork softwood species include ponderosa pine, Douglas fir, Southern pine, true firs, and Eastern white pine. Red oak and, increasingly, yellow poplar are the primary hardwoods used in this market along with basswood and cottonwood. An estimated one billion board feet of lumber was used in the millwork and moulding industry in 1990. The U.S. Department of Labor 1990 report indicates that nearly 3,500 companies manufactured mouldings and millwork.

Red oak is often used for high-valued mouldings and stair treads, risers, rails, and turnings. Other fine hardwood species can also be used for these products. Utility species such as yellow poplar, basswood, and cottonwood are used in moulding, picture frame material, and general millwork. In some cases, full length lumber strips are wood grained, painted, or foiled and sold. The strips can also be finger jointed to full pieces and then wood grained, painted, or foiled. The same species are also used for window parts. The largest volume of moulding and millwork is processed from the 5/4" and 6/4" sawn lumber, although 4/4" is also used for mouldings. The 5/4" and thicker dimensions allow for resawing at the plant into two or three pieces before they are further manufactured or used directly in stair treads, rails, and turnings.

According to the Wood Components Manufacturers' Association's *Rules and Specifications for Dimension and Woodwork,* lumber destined for use in moulding and millwork must be dried to a moisture content of no more than seven percent, according to accepted methods, depending on species and thickness. Specifications for hardwood and pine grades and tolerances are also covered.

A sawmill might produce what the WCMA refers to as rough dimension or semi-machined dimension products, depending upon available equipment or funds available for capital improvements. Obviously, the more machining involved, the larger the profit margin should become. Blanks cut and nipped to specific sizes and rough-surfaced on two or more sides to a nominal size are termed rough dimension. If finish surfacing, moulding, turning, tenoning, flat-sanding, equalizing, trimming, mitering, or other processes are utilized, the products are termed semi-machined. Defects can be eliminated from blanks by processing them through a crosscut saw operation, and short blanks can be fingerjointed to create needed lengths and face-glued to create desired thicknesses.

Sawmills with kiln drying capabilities seriously interested in serving the millwork and moulding markets will probably need to add some equipment, including a planer, ripsaw, crosscut saws, belt sander, and moulder. It may also need some clamp carriers for edge gluing. A mill can utilize lower grades of lumber and short length lumber by finger jointing. Finger jointed millwork is used traditionally for painted stock and trim. For this type of millwork, the sawmill will need a finger jointer and glue line.

It is very important to maintain tight quality control for mouldings and millwork. Among the factors important in producing quality millwork and mouldings are proper moisture content, acceptable raw materials, rate of feed of the moulder, number and speed of cutter heads, sharpness of the knives on the cutter heads, knife cutting edge bevel, thickness of the cut, and cutter head knife angles. Maintaining the knives and cutter heads is of primary importance in producing quality millwork and mouldings. Many types of millwork are sanded after the moulding process for better finishing.

As with many wood products, this industry has seen increased competition from substitute products and international markets in recent years. Extruded plastic and plastic-wood composites have entered the moulding markets. Radiata pine from New Zealand and Chile also have captured market share from traditional species. The sawmill wanting to enter this market needs to produce a high quality product to separate itself from this competition and might benefit from serving its regional area market.

Further information about markets can be obtained from the Wood Moulding and Millwork Producers Association in Woodland, California at (916) 661-9591; the Architectural Woodwork Institute in Centerville, Virginia at (301) 953-7264; and the Wood Component Manufacturers Association in Marietta, Georgia at (770) 565-6660. The WCMA publishes a set of rules and specifications that includes information on

hardwood interior trim, moulding, stair treads, and risers.

As sawmills search for ways to increase the value of their lumber, the demand for moulding and millwork offers yet another opportunity to further process wood products. It is particularly well-suited as a niche for lower grades and short length lumber which can be finger jointed. As with any new venture, the mill will benefit from exploring the needs of potential customers first, and plan manufacturing adjustments accordingly.

NICHE MARKET OPPORTUNITIES UNDERFOOT

As wood product manufacturers search for niche markets, they often overlook products such as stairs and stair parts. It is estimated that over 200 million board feet of lumber go into stairs and stair parts every year. Most of this volume is provided by medium or small architectural millwork companies throughout the United States, reflecting the traditional signs of being a niche market with many small manufacturers providing local needs and medium size companies providing the mass or retail markets. The 1995 *Directory of Wood Products Companies* identifies over 150 firms that provide wood stair parts, while the U. S. Department of Commerce lists over 400 firms that supply this market segment.

As with most products, the quality of lumber used for stair parts will depend upon their final use. Stair parts are normally manufactured from No. 2 and Better lumber, while premium hardwoods such as red or white oak, birch, maples, and ash are often used for exposed parts. These parts are stained or finished for a decorative appearance as part of the stairway. Softwoods such as Southern pine, ponderosa pine, or hemlock are used if the stair parts are going to be painted or covered. Wood used in stairways should be dried to near eight percent moisture content for indoor use. The wood products supplied must meet local building codes for strength and load bearing characteristics. As with all architectural millwork, appearance plays a very important part in marketing stairway parts, and may provide a new opportunity for sawmills.

Stairway parts include stringers, treads, risers, starting steps, handrails, balusters, newel posts, and related trim. The stringers, treads, steps, and risers are the primary load bearing members of the stairway. These members are traditionally made of solid sawn lumber and manufactured to grades which will carry the specified load. With the recent growth of engineered lumber, this portion of the market can expect more competition from such products as PSL, or parallel strand lumber. The panel industry is also trying to identify how it may be able to capture part of the stairway market.

The most common length of stair risers and treads is 36 inches. The riser is normally seven inches wide and the tread is nine to ten inches wide. Typically these are sawn from surfaced 2x8 or 2x1O lumber. However, for custom work, the size varies from stairway to stairway.

Handrails, balusters, newel posts and related trim are the aesthetic portions of the stairway. Although some of these parts play an important safety role, they also are often used to add to the beauty of a stairway. These parts can be solid wood or glued stock which is turned on a lathe to the desired size and shape. Stair part manufacturers require a variety of moulding and finishing equipment, much of which is custom built to fit their needs. Stair part manufacturing equipment includes planers, moulders, resaws, sanders, lathes, and a finger-jointing and gluing line. Manufacturers also utilize custom lathes and moulders manufactured for turning posts and railings to meet specific customer's needs.

Although this market is primarily serviced by the architectural millwork industry, opportunities exist for primary wood producers to manufacture to the specifications of millwork companies. A sawmill may be able to provide specific lengths or sizes to the stair part manufacturer, or package rough dried lumber to specific orders for the millwork firm. Squares cut to certain dimensions would allow the millwork company to manufacture railings or posts. A mill could also pull out character-marked lumber for aesthetic purposes for the stair part manufacturer. Serving the stair part industry may allow a mill to market short length or character-marked lumber that otherwise would end up in the chipper

There is no single association which promotes the stair part industry. The Architectural Woodwork Institute in Centerville, Virginia lists standards in its sixth edition of woodwork quality standards for stair parts. The Wood Component Manufacturer' Association and the Wood Moulding and Millwork Producers Association are two other organizations that can provide further information on this industry.

As sawmills try to identify new markets for their lumber products, the opportunity exists to partner with manufacturers of specific finished products, such as stair parts, to add value to their lumber and increase profit margins. Such a partnership is beneficial because the stair part manufacturer has the expertise required to produce precision wood components. Since these manufacturers specialize in making stair parts, they have the equipment and experience to process lumber to exact customer specifications. They also service and know the customers for the stair part industry.

As our industry turns the corner to the 21st century, successful forest products firms will identify those value-added markets that they can service best. These firms will need to add manufacturing capabilities or develop strategic partnerships with firms servicing the markets they identify. The stair part industry is just one value--added opportunity that may allow such a mutually beneficial opportunity.

TIMBER BRIDGE MEMBERS - AN UNTAPPED MARKET

It is estimated that four of every ten bridges in the U. S. are deficient, and that more than 80 percent of the country's 570,000 bridges are on rural roads. The forest products industry has an opportunity to rebuild the nation's infrastructure and at the same time capture value-added markets by producing modern timber bridges to meet the country's needs.

The total cost of replacing all deficient bridges through the year 2009 is estimated at over $100 billion, or $7 billion annually. Today, there are more than 40,000 bridges in service on U. S. highways. Prestressed concrete, steel and reinforced concrete are the other major materials used in bridge construction.

Traditionally, southern yellow pine and Douglas fir have been the species of choice in the manufacture of timber bridges. These species have been used due to both their availability in large dimensions and treating characteristics. Since the inception of the Timber Bridge Initiative (now the Wood in Transportation Program) by the U. S. Congress in 1989, a strong emphasis has been placed on using low-value or under-utilized species for timber bridges. Administered by the USDA Forest Service in Morgantown, West Virginia, the program has seen modern timber bridges utilize yellow poplar, oak, red maple, elm, cottonwood, aspen, red pine, hemlock, ponderosa pine, southern yellow pine and Douglas fir.

The oldest and most common design for timber bridges in service today is the sawn-stringer

with lumber placed across the stringers the width of the roadway. However, modern timber bridges have been developed to increase performance and durability. The most common modern designs for timber bridges include dowel-laminated, glue-laminated, and stress-laminated. Further design information can be obtained from the WIT office

All lumber used in bridge construction must be pressure treated with an AWPA-approved wood preservative. The most common and best preservative used for highway bridges is creosote. It not only offers excellent protection against insects and decay, but offers water repellency that also helps protect the wood. Although there has been much interest in using copper chromated arsenate (CCA) to treat the softwood species used in bridge construction, it has proven not as effective as the other preservatives. It does not have the water repellency of the oil-borne treatments and CCA chemicals are more corrosive to bridge hardware that other preservatives.

All bridges that become a part of the highway system must be designed and approved by a registered civil engineer. These individuals make the decisions that dictate the type of timber and bridge design used at specific locations. One of the major obstacles for the adoption of modern timber bridges for rural roads has been the lack of wood design education received by many highway engineers. Understanding the needs of officials making bridge-building decisions, as well as regional requirements, is essential to reaching this market.

Companies entering this market will have to spend some time educating engineers about the advantages of lumber for bridge construction — including ease of construction (quick, year-round construction), resistance to de-icing chemicals, aesthetics, and competitive prices. Promotion in the bridge market should be directed to the decision makers who specify the type of material to be used. The final sale, however, is to a highway or bridge contractor who will bid on the project.

Research at Virginia Tech indicates that there are currently over 40 U. S. companies supplying wood for bridge construction. These firms have an average of eleven individuals producing bridge material. The average selling price of a complete bridge package is $2,400 per MBF. This compares to lower grade hardwood lumber, which sells — rough, green and untreated — for between $300 and $500 MBF. The bridge package includes the treated, fabricated lumber and all galvanized hardware to assemble the bridge. There is an average of 17,000 BF of lumber in a bridge, with some 300 to 400 timber bridges built on U. S. highways every year, not including those built in private developments or on USDA Forest Service roads.

Information on the latest timber bridge technology and markets can be obtained from the Wood in Transportation Program in Morgantown, West Virginia; the USDA Forest Products Laboratory in Madison, Wisconsin; the University of West Virginia; Penn State and Virginia Tech. A comprehensive Timber Bridge Manual has been published by the USDA Forest Service and is available from the WIT office.

Furnishing lumber for timber bridge construction is a unique value-added opportunity for forest products companies wanting to diversify their customer base. Timber bridges can provide a market for lower grade or value lumber. Mills with the capacity of sawing large dimension lumber may grasp this opportunity to receive maximum value from specialty products. If marketing to specifiers proves beyond a mill's capabilities, a sawmill may still market lumber to firms already manufacturing timber bridges.

This niche market not only includes highways, but also railroads and foot and bike paths. It can be a good product addition for sawmills seeking to diversify from commodity lumber products. ■