WE DON'T MAKE WOOD, WE MAKE WOOD BETTER

Comments accompanying receipt of the 2008 SWST Distinguished Service Award

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As I enjoy my new *distinguished* status in the Society of Wood Science and Technology, I want to thank profusely the committee and the entire membership. This honor is a nice cap to a long and rewarding professional career and I will wear it with pride and gratitude. With cap in place, my thoughts turn to the Society's own *distinguished* status. I am reminded how far we have come since Bob Youngs, Jim Bethel, and Steve Preston first began to dream about a society that would represent the *scientists* and *technologists* who develop knowledge about wood and its uses.

With many follow-up contributions over the years, it can be said that we, the Society, are outstanding within our profession. Our journal reflects a high degree of professionalism both in quality of the journal and in the quality of the research it chronicles. Articles cover a wide range of subjects representing the breadth and depth of our profession. The properties of wood are now known in chemical, physical, and anatomical detail as never before, and many means of modifying properties have been developed, although much remains to be learned.

Being outstanding *within* our profession is a significant accomplishment. This aspect of the status will easily continue in the future because it is based on the strengths of our members. However, we face other challenges, one of which is something we are not good at: blowing our horn, public relations work. Our profession is by nature a rather obscure activity. The important work we do gets seamlessly integrated into the innovative fabric of progress and therefore does not get the recognition it deserves. Public relations work becomes a need because our future depends on attracting new members, more students, and funds for research. Most of the sources for addressing these needs reside outside our sphere of influence.

There is a lesson to be learned from BASF, a company that also has obscure scientists. Their situation is similar to ours in that their research gets integrated into the products of other companies. They too had a recognition problem and solved it by running two-page advertisements in popular magazines that simply said, for example, "We don't make light bulbs, we make light bulbs better." Paraphrased for wood, their slogan fits us too.

Our members do not make anything either. However, they make knowledge and knowledge makes things *better*. Like BASF, the importance of our research is not widely known. The reasons are buried not only in the nature of our profession, but also in the nature of wood.

Wood has natural advantages such as high strength for weight and an ability to serve all three of the major functions of a building material: structure, closure, and appearance. Its easy workability allowed it to be used for centuries without benefit of science. However, the increasing production of composites and modified wood products has increased the role of *wood scientists* and

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technologists. Although importance has increased, visibility has not. A bit of wood product history reveals how our role of making wood *better* evolved.

The first useful knowledge about wood was not very scientific, probably coming from observations by woodworkers. They saw visual characteristics indicating low strength such as knots, deviant grain, and rot. This information did not make wood *better,* but it resulted in better *use* of wood. The improvement was the result of a *selection process* that this simple knowledge made possible.

Scientific input began, for practical purposes, when early in the past century *botanists* and *anatomists* provided a connection between better wood and how it grows. The addition of mechanical properties further improved the *selection process*.

Wood was perhaps first made *better* by laminating *selected* lumber into beams. This process enhanced strength by including only the best wood in a beam and also by increasing its I value. Putting poor wood in the center of laminated beams without decreasing strength was *engineering* logic. The beams owed their strength and durability to the bond created by casein glues. Laminated beams were first made *better* when *chemists* developed resorcinol-based adhesives that were more durable.

Wood scientists helped make beams even *better* when they discovered a direct correlation between the sonic properties of wood and its strength. This led to means for selecting the highly stressed top and bottom boards using nondestructive strength testing. Laminated veneer lumber partook of the same science, leading to the best lumber ever made.

Plywood went through a similar path of improvement. It was first made with soybean-based glues in cold presses. The development of phenolic adhesives made plywood *better* by improving its durability against moisture. This development propelled plywood into one of the most favored construction materials.

However, heat to cure the phenolic resin introduced a new problem in the manufacture of plywood. Moisture in the veneer became a critical factor. Too much moisture causes poor bonding. *Wood scientists* helped solve the moisture problem when they discovered that dielectric properties of wood were sensitive to MC. Their work integrated into methods of monitoring the moisture of veneer as it emerged from the dryer. High-moisture veneer could then be selected and recycled through the dryer.

Particleboard was developed as a means of adding value to sawdust and scrap wood. Because it had a smooth surface, its chief use was corestock in furniture panels and as underlayment for flooring. However, it had two flaws that threatened its entire market: irreversible swelling, "springback," in contact with moisture, and formaldehyde emission. Springback is basically the result of wood being compressed beyond its elastic limit, and formaldehyde emission is the result of slow release of the chemical from the glue used in consolidating the board. Making particleboard *better* is a continuing goal for *chemists* and *wood scientists* in reducing formaldehyde emission and making compressed wood stay compressed.

Flakeboard is a relatively modern product with properties approaching those of plywood as a result of the cross-grain orientation of neighboring flakes throughout the width and thickness of a panel. The favorable acceptance of flakeboard in the market invited research and development to improve its manufacturing methods. Making good flakes and distributing them uniformly are mostly mechanical problems. However, heat and moisture interacting with wood and glue are also a source of problems. Making this product *better* therefore was and still is a distinct problem for *wood scientists and technologists.*

A *wood technologist* made flakeboard *better* merely by reducing the width of the flakes. This allowed the flakes to be aligned along and across the panel in a *controlled* manner rather than *random* like in flakeboard. This simple change produced more precise cross-grain formation, increasing strength and uniformity. Oriented strand board (OSB) is one of the most significant developments of all time because it not only resulted in a more substantial replacement for plywood, but also because it could be made with low-quality trees. Making OSB *better* is therefore an unending goal of all wood researchers.

Newer composites that combine wood with plastics have raised challenges not previously encountered. In these new composites, two basically incompatible materials are combined and expected to perform in the most severe outdoor environments where surface integrity and bending strength are requirements. All the problems of previous composites exist here plus a crucial *adhesion* problem and a different pressing system. They raise composites to a new level of complexity. Making this product *bette*r is clearly in the domain of SWST.

In addition to these developments that made wood *better* by recomposing it, there were developments by *wood scientists* and *technologists* of equal importance that made wood *better* by improving its resistance to fire, decay, and dimension change. These developments also should have gotten more public attention.

BASF resorted to expensive advertisements to get their message out. A cheaper and perhaps better approach is available. Each issue of the SWST journal contains important information for the profession, for industry, and ultimately for society in general. The SWST journal preaches it to the choir. To impact the public mind, it should be encapsulated in laymen's terms with its importance clearly emphasized and then distributed to the media in steady releases. Better yet, a documentary *a la* Ken Burns, "How Flakeboard Saved the Forest Economy," might popularize SWST as well as the entire industry.

Because we work with wood, a material that is tied to the destiny of humanity by virtue of its widespread usefulness and beneficial environmental effects, and because its continued usefulness is the province of *wood scientists* and *technologists* of all specialties, ours is a *noble* profession and it demands the best we have to offer.

My best wishes for continued success of SWST and may all have a *better* response to their work.