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## Checking Out the Action Underneath the Action at This Year’s NCAA Tournament

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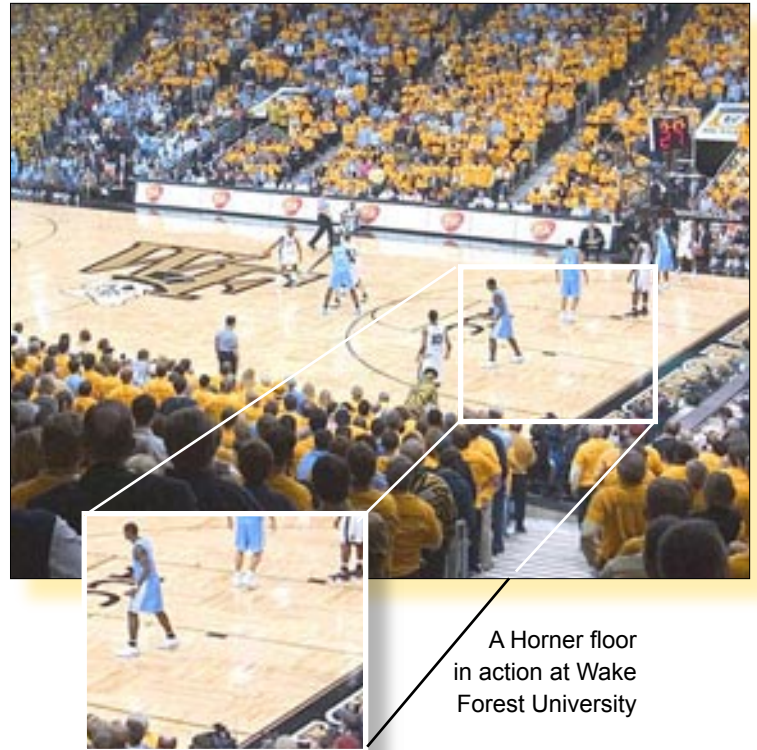
by Gordie Blum,  
FPL public affairs director

Though most of them are a bit short, can’t hit the jumper, and certainly won’t be one of Dick Vitale’s “Diaper Dandies,” researchers at the USDA Forest Service’s Forest Products Laboratory (FPL) have played a

highly visible (*but let’s say “supporting”*) role in this year’s men’s NCAA basketball tournament...and the women’s tournament...even the NBA All-Star game. In fact, even though most of them probably haven’t (*and probably couldn’t*) played a full court game in years, they’ve had a major “impact” at just about all the big basketball venues.

It doesn’t get as much attention as the breathtaking athleticism being displayed on the court, but the wooden floor underneath the action is an important part of the game. Just ask a Boston Celtics fan how important it is to still visualize Cousy, Russell and Havlicek driving to the rim on the beautiful parquet floor of the old Boston Garden. You could make a case that the floor is even more important in today’s game. Given the fact that NBA teams have

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A Horner floor in action at Wake Forest University

## FPL Archives Shed Light on Howard Hughes and His Airplane

by George Couch, FPL public affairs specialist

“Howard Hughes of Hughes Aircraft Co. telephoned from Washington on October 22 . . . The call came in about 5:00 P.M.”

Thus begins a memo to the file, dated October 25, 1943, from George M. Hunt, chief of FPL’s division of wood preservation. (In three months, Hunt would become assistant director of FPL, and in 1946, director.)

“He [Hughes] is greatly concerned about attempts that he says are being made to cancel the contract for making the huge flying boat, the H K 1, that he and Kaiser [industrialist Henry J.] are now developing under Government contract,” Hunt wrote.

According to Hunt, Hughes said that cancellation of the contract or a change from wood to metal

*(continued on p.2)*



## FPL Archives Shed Light *(continued from p. 1)*

would give a permanent black eye to the use of wood in airplanes.

Hughes' obsessive effort to build the world's largest airplane—widely (and somewhat cynically) known as the “Spruce Goose”—is dramatized in the highly acclaimed movie *The Aviator*. Less dramatically perhaps, an old file at FPL also sheds light on the man and his machine.

Hughes told Hunt that Sherman Fairchild had suggested he contact FPL for help defending the concept of a wooden plane. Fairchild, a friend of Hughes, was a successful inventor and airplane designer and builder. A year earlier, in August 1942, FPL, at the request of airplane manufacturers and the Army, Navy and Civilian Aeronautics Board, had published *A Wood Aircraft Fabrication Manual* and an *ANC Handbook on the Design of Wood Aircraft Structures*. And Hughes' engineers had contacted FPL for assistance in testing wood specimens and adhesives as early as January 1941. Understandably, FPL seemed the logical place to seek help.

Hughes said he needed factual information for a hearing scheduled the following week in Washington. “Hughes asked if we could send a man to

Washington right away at his expense to bring samples and data bearing on

1. The durability of glue joint exposed to water.
2. The rate of water absorption or weight increase through finishes, such as might have been learned from studies of boats.
3. Resistance of glue joints to gasoline, oil, water, weather.
4. The relative suitability of spruce and birch for the job.
5. All other information that would have a bearing on the suitability of wood for this job.”

Hunt wrote that he told Hughes that “we are not in position to say that wood is the best material for this job. All we could do is to state the facts as we see them.” Hughes “said that facts is all he wants,” Hunt wrote.

Hughes, according to Hunt's memo, urged Hunt to get to Washington Sunday if possible—the phone conversation took place Friday. When Hunt suggested that FPL might want to send

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more than one man, Hughes replied, “Send all the men you want.”

The two men agreed to talk again the next day, Saturday. When Hughes called Hunt early Saturday evening he told Hunt that the hearing had been postponed and the government would continue funding, permitting him to continue with wood for at least another 30 days. Instead of Hunt going to Washington, Hughes would send someone to FPL for several days to collect information that might be helpful.

Hughes called Hunt again later that evening.

“In the second call he apologized again for making us so much trouble and expressed his appreciation for our willingness to help,” Hunt wrote.

Hunt’s memo supports Hughes’ reputation for attention to detail. Recounting that second phone conversation Saturday evening, Hunt wrote, “I told him that we have some doubt about the suitability of urea glue and would prefer to see a phenolic glue used in production although urea glue would be all right for static tests. He [Hughes] seemed surprised and interested but stated that on some parts they could not get heat to the joints. I told him that there is hope that we will soon have phenolic glues that will set satisfactorily with very little heat.”

Hunt also wrote that he suggested that FPL “might be more helpful if some of our men could consider other phases of the problems of using wood and glue in this plane by visiting his plant

and getting first-hand information on them. He was interested and offered to pay expenses if they would come.”

Hunt’s memo concludes: “We may thus have a good opportunity to dig beneath the surface a

little and possibly to do them some real good on their wood engineering, selection, handling, and gluing practices.”

As it turned out, FPL personnel were involved with the Spruce Goose off and on for the next seven years. By the end of 1943, FPL’s assistance had also been requested by the Civil Aeronautics Administration team that was monitoring the Hughes project in California. Even after the mammoth plane’s short, historic flight in November 1947 and the eventual cancellation of Hughes’ government contract, FPL remained engaged in the project. Filed letters and memoranda recount on-site visits to California and continuing discussions of various modifications



and adhesives as late as 1950, while the giant plane lay in storage in a specially built, air-conditioned hangar.

In 1975, when word reached FPL that the plane was to be dismantled, the lab requested some pieces. The plane was saved from demolition, however, and a few years later was placed on display intact in a waterfront museum. Today, all FPL has to show for its efforts are a musty correspondence file and some photos of the plane under construction.





## What's a Highfalutin Word Like "Nanotechnology" Got To Do With Trees?

by George Couch, FPL public affairs specialist

Last October, the USDA Forest Service's Forest Products Laboratory joined forces with the pulp and paper industry and others to conduct a two-day workshop on nanotechnology for the Forest Products Industry. While "nanotechnology" has been showing up in popular magazines and TV programs in recent months, most reports conjure up images of fantastic ideas such as miniature devices injected into a patient to attack cancer cells or describe existing applications such as new stain-proof fabrics for clothing. To get some idea of how nanotechnology might relate to forest products, *NewsLine* directed a few questions to FPL's Ted Wegner, assistant director for Wood, Fiber and Composites Research and one of the principal organizers of the October workshop.

### Nanotech Takes Stage at Composites Conference

When the 8th International Conference on Woodfiber-Plastic Composites, sponsored jointly by the Forest Products Society and the USDA Forest Service Forest Products Laboratory, opens in Madison this May, nanotechnology will be prominent on the agenda. For the first time, an entire half-day session of the annual conference will deal with the subject of nanocomposites. Presentations related to nanomaterials are scheduled by researchers from Argentina, Canada, Great Britain, Kuwait, and Norway as well as the United States. "At past conferences, we've had an occasional presentation dealing with nanotechnology, but this is the first year we've made it a major topic," said Craig M. Clemons, materials research engineer at FPL and chair of the upcoming conference.

For information about the conference, contact Forest Products Society, phone 608-231-1361, e-mail [conference@forestprod.org](mailto:conference@forestprod.org), or visit the society's website: <http://www.forestprod.org>



**NewsLine:** *Just what is "nanotechnology"?*

**Wegner:** Nanotechnology is the creation and utilization of materials, devices and systems with novel properties and functions that are achieved by manipulating matter at the scale of 1 to 100 nanometers. [Editor's note: A nanometer is one-billionth of a meter. A typical sheet of paper is about 100,000 nanometers thick.]

Nanotechnology is about much more than size. To be considered nanotech, a nanoparticle must have physical, chemical and biological properties that are fundamentally different from the properties of the individual atoms or molecules or bulk material. It is these new, unique properties that make nanomaterials and nanotechnology so promising to scientists and engineers in many fields.

**NewsLine:** *How is nanotechnology relevant to the forest products industry?*

**Wegner:** The ability to organize, characterize and manipulate matter at the nanoscale has launched a revolution in science, engineering and technology. The National Nanotechnology Initiative, launched four years ago, has led to the enactment of the 21st Century Nanotechnology Research and Development Act, which calls for the National Science and Technology Council to develop a strategic plan for federal nanotechnology R&D programs. The Federal expenditure for nanotechnology R&D this year is about \$1 billion.

Some observers think this nanotechnology "revolution" may be more significant than the industrial revolution of the 18th century, and even those with more conservative expectations envision far-reaching outcomes in scientific knowledge and in a wide range of technologies in industry, healthcare, biology, conservation of materials and energy, environment and education.

Forest products relate to nanotechnology in two broad areas: First, nanotechnology could be used to make totally new or improved products, whether wood, composites or paper and other





FPL assistant director Ted Wegner believes nanotechnology can play a big role in forest products industries.

pulp products. Second, because wood is made up largely of lignin and cellulose, which in turn are made up of unique nanoscale components, wood could well become a major source of nanoscale materials for use in other industries.

Major areas where we want to direct immediate attention for the forest products industries include

- 1) the design of nanocomposites, such as combining wood and wood-based materials with other nanomaterials and nanosensors to make new generations of high-performance products;
- 2) how biopolymers made

from renewable forest resources might be used in creating novel biopolymers, or active functional surfaces, or coupling biopolymers with inorganic nanomaterials; and

- 3) using our understanding of the architecture and ultrastructure of cell walls to grow trees that would produce wood-based (or lignocellulosic) nanomaterials with unique properties.

The possibilities are endless. For example, we can envision wood- and paper-based products with built-in nanosensors to measure forces, loads, moisture, temperature, pressure, and chemical emissions or to report attacks by wood-decaying fungi or termites. Nanotechnology opens opportunities for such things as wood-based pharmaceuticals and self-sterilizing surfaces. We could produce siding that generates and stores electricity and changes to any color or shade that we want. Structural lumber and composites could tell us when they are over-loaded and that can repair themselves when attacked by decay or insects. We could print a novel on a single sheet of paper or make food packaging that tells us when food has spoiled.

**NewsLine:** *What was the purpose and outcome of the joint nanotech workshop last October?*

**Wegner:** In March 2004, the American Forest and Paper Association (AF&PA)/Technical Association of the Pulp and Paper Industry (TAPPI) held an Agenda 2020 Technology conference, where we concluded there was a need to identify and prioritize the opportunities and R&D needs for applying nanotechnology in the forest products industry. A committee of volunteers from industry, academia and government put together the October workshop. Our objectives were to

- develop a vision for nanotechnology in the forest products industry;
- develop a roadmap for nanotechnology in the forest products industry identifying potential applications, knowledge gaps and the research needed to fill those gaps;
- attract funding for forest products research from Federal agencies concerned with nanotechnology R&D; and
- foster collaboration among industry, academia and government to fill the knowledge gaps.

The workshop concluded that wood-based (lignocellulosic) biopolymers are important to nanoscience and nanotechnology because:

- 1) lignocellulosic biopolymers are one of the most abundant biological raw materials, have a structure based on nanoscale fibers (or nanofibrils), have the *(continued on p. 6)*



## Questions?

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## Action Underneath the Action

*(continued from p.1)*

invested millions of dollars in their players, and that college players hope someday to make some of those millions, it's imperative that they play on a sound, professionally constructed surface.

To say it must be durable is an understatement. To help visualize the pounding a floor must withstand, imagine having Shaquille O'Neal jump up and down in your living room 50 times a day for a few years. And since most major coliseums are home to more than one team or event (it's not unusual to have a hockey game, rock concert and basketball game in the same week), it's also imperative that the surface be easy and quick to set up and take down.

As with most wood manufacturing businesses, the wood flooring business is very competitive. One of the oldest and most successful is the Horner Flooring Company of Dollar Bay, Michigan. Horner has been around since 1891, the same year James Naismith invented basketball. Horner specializes in making high-end portable hardwood flooring surfaces for many NBA and NCAA venues. In fact, every NBA All-Star Game and NCAA Final Four since 1983 has been played on a Horner floor.

## Secondary wood manufacturing industry faces tough times

As in many rural states, the wood products industry *(continued on p.7)*

## Nanotechnology

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- potential to be made multifunctional, and self-assembly can likely be controlled;
- 2) lignocelluloses as nanomaterials and their interactions with other nanomaterials are largely unexplored; and
  - 3) new analytical techniques adapted to biomaterials are allowing us to see new possibilities.

**NewsLine:** *What will FPL need to do or change in order to pursue nanotechnology?*

**Wegner:** FPL is positioning itself to become the lead Federal research facility with regard to the role of nanotechnology in forest products. We are determining the highest-priority research areas based on FPL's mission, the needs of the Forest Service, our capabilities, and our resources. We are moving to link with the National Science Foundation (NSF) and the

Dept. of Energy nanotechnology centers to have access to specialized equipment and instrumentation. We will need to work more closely with the NSF and participate in the National Nanotechnology Initiative (a \$982 million per year program). As we proceed, we will continue to redefine FPL's role in carrying out nanotechnology research.





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is one of the primary economic drivers for the Western Great Lakes region of Minnesota, Michigan, and Wisconsin, employing more than 300,000 people. Horner employs more than 100 people at its headquarters in northern Michigan. The factory is one important outlet for the hardwoods from Michigan's Upper Peninsula. However, the wood products industry, not only there but all over the country, is under tremendous economic pressure, mainly because

- most are small businesses, and therefore lack the resources and capital needed to recognize and implement technological advances and lean manufacturing processes, and
- a variety of factors such as cheaper labor and healthcare costs have sent many manufacturing jobs overseas.

### **A call to the Forest Products Industry “Dream Team”**

According to FPL researcher Bob Ross, keeping these businesses competitive and open is important both to local economies and to the overall health of our forests. “To properly manage our forests, to maintain a proper balance of mature and young trees, we need markets for the timber that needs to be removed from our forests. The health of our forests really relies on our ability to keep businesses like these running. What we strive for is a situation where jobs are maintained, rural economies remain strong, and forest health is protected.”

One of the ways FPL is doing that in the Midwest is through a partnership with the University of Minnesota–Duluth’s Natural Resources Research Institute (NRRI). NRRI’s approach is to pull diverse subject matter experts from various sources such as FPL to create a team aimed at helping small businesses improve their bottom lines to stay competitive.

Brian Brashaw, NRRI project leader, says “unlike typical consultants who usually come in, inspect a business from the outside, and then offer recommendations without really engaging the company, we truly work hand in hand with them. We make it a point to start with team members from the business we are

trying to help. Usually these are folks who are doing ground-level work, have some ideas about how to improve the process, but really have no way of getting their ideas to upper-level management where change can occur. Our process gives them that venue. We also support their ideas with needed technical and engineering expertise.”

Brashaw adds that this unique approach helps the team to get buy-in from the company and thus get their recommendations implemented. He says many times businesses become so entrenched in their operations that they continue to do things “just because we’ve done them that way for 20 years. It sometimes takes someone from the outside to ask the right ‘why’ questions.”

Two areas the team typically focuses on are improving the product and improving the process or manufacturing system. The goal is to improve efficiency and eliminate waste.

Says Ross, “We applied many facets of our FPL research program to the flooring system. We improved the connectors that hold the floor together. We looked at the substrate and structure, which is usually plywood or oriented strandboard, products that got their genesis at the Forest Products Lab. We looked at finishing and drying schedules. We even looked at moisture absorption and vibration characteristics. In the end, working as a team we were able to help Horner come up with an improved product that was easier to manufacture.”

Ross says that any forestry-based business interested in getting some help should check out NRRI and the Forest Products Laboratory at [www.fpl.fs.fed.us](http://www.fpl.fs.fed.us), or by calling FPL at 608-231-9200.

Ross also says that getting to work on a project like this was a thrill he won’t soon forget. “You know, you watch some of these games being played, and you think, wow, I had a hand in that. It’s a good feeling. And I also realize this was probably the only way a middle-aged guy like me was ever going to get on the same basketball floor as Shaq.”





## NewsLine

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Chris Risbrudt  
Director

## Ask FPL

*We get thousands of questions each year about wood and paper products.  
In each issue of NewsLine we print what we feel are some of the best. Here are two we recently received.*

**I am planning to build a log home next year. What is the best type of wood to use?**

Species such as cedar, spruce, pine, fir, and larch are desirable for log home construction because of their uniform diameters, slight taper, and availability. Species known for naturally decay-resistant heartwood, such as redwood, are not generally used for log homes because of their limited availability and high value for other products. Also, most logs on today's market come from small trees that consist mostly of sapwood, which has little resistance to decay compared with heartwood.

Other considerations may be more important to the quality of a log home than the species of the log. Logs of any species should be peeled and sufficiently dried before being used for construction. Peeling allows for easier construction and maintenance and increases durability. Peeled logs should be protected from driving rains and stored off the ground so that air can circulate around each piece. Logs should also be allowed to dry sufficiently, preferably for six months, prior to construction. Thorough drying decreases the propensity of wood to decay and allows dimensional changes resulting from drying to occur before construction.

For more information, visit our website at [www.fpl.fs.fed.us](http://www.fpl.fs.fed.us) or contact us to request a Log Home Information Packet.

**I am a woodland owner and am considering using my land as a source of secondary income. What opportunities are there for small forest products businesses?**

There are many opportunities to create businesses based on forest resources. Timber production often comes to mind first, but many other products have potential to generate income. Wood chips, sawdust, bark, charcoal, smoke wood, aromatics, pharmaceuticals, weaving materials, and cones and seeds are all marketable products that can come from trees.

However, the wood on your land may not be the only possible source of income. Forest lands also provide edible products, such as berries and wild fruits, honey, mushrooms, nuts, and syrup. And don't forget about the recreational value of your land for activities such as camping, horseback riding, or fishing—you may be able to create a successful business by providing people with an experience rather than a product.

For more information, see *Income Opportunities in Special Forest Products* at [www.fpl.fs.fed.us](http://www.fpl.fs.fed.us).