



# NEWS RELEASE

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## FOR IMMEDIATE RELEASE

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### Surprised To Hear That Wood Propellers Are Still Used By The Military? Phone Call To USDA Forest Products Lab Rekindles Their Interest In Wood Propellers

MADISON, Wis.— In mid-July 2006, an anxious phone call from a leading manufacturer of airplane propellers to the USDA Forest Service's Forest Products Laboratory (FPL) rekindled FPL's involvement with wood propellers and research to meet wartime needs of the U.S. military.

Nearly 90 years ago, as World War I dragged on in Europe, FPL, which had been conducting research related to wood aircraft frames for the U.S. War Department (predecessor of today's Department of Defense), established an experimental propeller laboratory to investigate the problem of warping and twisting caused by atmospheric humidity. Technicians worked around the clock, in three shifts, producing experimental propellers under controlled temperature and humidity conditions. When the war ended, the military asked FPL to complete the work because of its importance.

The recent phone call, from Sensenich Wood Propellers in Plant City, Fla., echoed that wartime project. Sensenich makes propellers from laminated sugar maple veneer for the Shadow 200™ tactical unmanned aerial vehicles (TUAV), which are used for reconnaissance and surveillance by American soldiers in Iraq. The harsh operating conditions in Iraq necessitate frequent prop replacement.

Sensenich has been making wooden propellers since 1932, and they've been making propellers for military UAVs for more than 40 years. But making propellers that would be subjected to the conditions experienced in Iraq was new.

Steve Boser, vice president for engineering at Sensenich, wanted to know more about the potential effect on the propellers of the transition from the humidity of Florida to the dry conditions in Iraq, where they might be stored for up to several months.

Boser wanted to find out just how much the predrilled mounting holes would move or shrink as the seasoned wood endured the extreme conditions of Iraq. So he called on one place he had often called before when technical questions arose about the performance and engineering qualities of wood: FPL, the nation's leading research facility focusing on wood utilization and preservation. Researchers there have accumulated masses of data about the behavior of wood under a variety of conditions.

Describing the problem to FPL's Rick Bergman and Robert Ross, Boser asked if FPL could provide precise data on the shrinkage of the propellers as they dried. Given the urgent nature of the project, the FPL researchers agreed to tackle the problem immediately and process the paperwork later.

On July 20, a package of seven propellers, two of them sealed in plastic bags, arrived at FPL. After some initial measurements were made, they were placed in a controlled-environment room to stabilize at a uniform "normal" 11 percent moisture content. A few days later, the five unsealed blades underwent a series of measurements . . . 66 measurements per propeller. On Friday, July 28, the props went into a laboratory oven at 150° F to dry to 3 percent moisture content, similar to the condition expected following a few months storage in Iraq. That weekend, FPL electronics technician Marc Joyal repeated the measuring process seven more times at six-hour intervals as the wood dried. The resulting data were used to produce engineering drawings depicting the shrinkage and resulting movement of the mounting holes. Digital imaging verified the physical measurements obtained with calipers.

FPL reported back to Boser that analysis of the measurement data revealed shrinkage and movement of the predrilled holes consistent with earlier research findings about wood shrinkage. In his formal report to Boser, FPL's Bergman suggested a few approaches to avoiding problems, such as making the laminated blanks and shaping them into propellers under controlled-humidity conditions more similar to conditions in Iraq, or sealing them in airtight packaging to prevent further drying.

For FPL's Joyal, who spent the weekend measuring and remeasuring the propellers, the importance of what he was doing—and doing it quickly—was clear. Joyal had served several months in Iraq in 2003 as a First Sergeant in an Army National Guard unit from Wisconsin.

The USDA Forest Service Forest Products Laboratory was established in 1910 in Madison, Wis., with the mission to conserve and extend the country's wood resources. Today, FPL's research scientists work with academic and industrial researchers and other government agencies in exploring ways to promote healthy forests and clean water, and improve papermaking and recycling processes. Information is available at FPL's Web site: [www.fpl.fs.fed.us](http://www.fpl.fs.fed.us). Through FPL's Advanced Housing Research Center, researchers also work to improve homebuilding technologies and materials.

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