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Reducing Cost to Government for Printing Paper Researchers Collaborate to Reduce Cost and Improve Paper Performance

MADISON, Wis.—Researchers at the USDA Forest Service Forest Products Laboratory (FPL) have joined with other federal agencies in an effort to reduce the economic costs and environmental impacts of the paper commonly used in government offices—while simultaneously optimizing the paper’s performance for government applications.

The federal government annually buys some 500,000 tons of bleached kraft paper, which includes the “plain white paper” used in computer printers, copiers, and fax machines. It’s the equivalent of using 11 million standard sheets of paper per hour, every hour of the year. (Even so, the federal government accounts for less than 2 percent of the bleached kraft paper produced in North America each year.)

Working with the Environmental Protection Agency’s Office of Pollution Prevention and Toxics, the FPL researchers initially will work to redefine paper “quality,” that is, to determine what performance criteria for paper are most important to the federal government. The effort to examine government paper standards and specifications based on performance is mandated by Section 506 of Executive Order 13101, dated Sept. 14, 1998, and titled “Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition.” The order is to be implemented by the Office of the Federal Environmental Executive.

“One way to improve some paper performance characteristics while simultaneously reducing cost is to reduce the amount of bleaching,” explains Dr. Carl Houtman, a chemical engineer in FPL’s paper-research unit. “Reducing bleaching would conserve energy, wood pulp, water and chemicals. The resulting paper will likely be stronger and more durable and possess other characteristics that better meet the government’s needs.”

Not surprisingly, however, limiting bleaching would also reduce the paper’s “brightness.” Brightness is defined by the International Standards Organization (ISO) as the percentage of blue light at a particular wave length (457 nanometers) that is reflected by the paper’s surface. Brightness is normally

expressed as a percentage, with standard office printing papers being in the range from 82 to 95. A brightness index of 90 or above is commonly associated with “high quality” papers. Some manufacturers add fluorescent compounds to the paper’s surface to increase brightness—even above 100 percent. At least one major store chain advertises paper with a brightness index of 113.

Because pulp is usually bleached at least five points higher than the final paper brightness to compensate for a phenomenon called brightness reversion, paper with an 84 brightness index—like much of that used by government agencies—requires bleaching to a brightness of 89.

The researchers are challenging the assumption that high brightness is important for many federal government applications.

“Depending on how the paper is being used, high brightness might be undesirable,” Houtman says. “For example, it might create glare that could interfere with readability. And the amount of bleaching needed to achieve a high brightness will have a negative impact on qualities such as durability or printability.”

And, of course, achieving high brightness ratings generally requires more energy, more chemicals and more wood pulp. A shorter process could reduce energy consumption by a third and similarly reduce handling and consumption of chemicals used in bleaching, such as hydrogen peroxide, chlorine dioxide and alkali. Water-treatment costs would be reduced as well. Pulp yield could be increased as much as 1 percent, resulting in an annual savings of some 500,000 tons of green wood.

Preliminary studies indicate that bleaching to only 80 or so brightness could reduce the cost of paper by \$34 a ton, saving the federal government \$17 million a year. A typical pulp plant processing 1,000 tons per day would save more than \$11 million per year, and there are some 70 such plants in the United States.

Eventually, the big savings will come when less-bright paper becomes more widely accepted for applications where high brightness is not required. In North America some 40 million tons of bleached kraft paper are produced each year, and 98 percent of this paper is used by businesses, state and local governments, and consumers.

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. Through FPL’s Advanced Housing Research Center, researchers also work to improve homebuilding technologies and materials.

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