

# Two New Pulping Technologies

## Fiber Loading and Biopulping: A Winning Combination

**Fiber loading**—In the papermaking process, filler is often added to the pulp to decrease the amount of valuable fiber used. This saves money and resources, but the resulting paper can be weak because the fibers do not bond well with the filler. Researchers at the USDA Forest Service, Forest Products Laboratory (FPL) developed a technology called fiber loading that increases the benefits of using filler and also solves the weakness problem. In fiber loading, precipitated calcium carbonate is deposited within, on the surface of, and outside the pulp fibers. By placing filler in and on the fibers, instead of between them, the fibers can still successfully bond to one another, increasing the paper strength. More filler can be used with this process since it does not interrupt the bond between the fibers. Calcium carbonate is also less costly than filler. The result is a strong, economic, bright and lightweight paper.

**Biopulping**—Biopulping was developed by FPL to reduce the amount of energy used in mechanical pulping. Wood chips are treated with a lignin-degrading fungus prior to mechanical pulping. The fungus “softens” the wood, resulting in 30% less electrical energy needed to produce more porous and highly fibrillated fibers compared with traditional mechanical pulping. However, biopulping also produces some unwanted effects. Paper made with biopulping has a reduced fines content, which decreases the opacity of the paper. The fungus also darkens the lignin in the process, resulting in a loss in paper brightness.

**When used together**—FPL researchers have discovered that the brightness and opacity loss associated with biopulping

can be corrected if fiber loading is also applied. The precipitated calcium carbonate used in fiber loading is very bright and it counteracts the darkening that occurs through biopulping. Fibers can also be simultaneously bleached with hydrogen peroxide during this process to further increase brightness. Also, fiber loading the biopulped material produces stronger pulp, and the loss of fines in biopulping is corrected by the increased filler level that occurs as a result of fiber loading. When both processes are used, the end product is stronger, brighter, lighter weight, and has higher opacity compared with the products of traditional processes, and less energy, money, and resources are used.

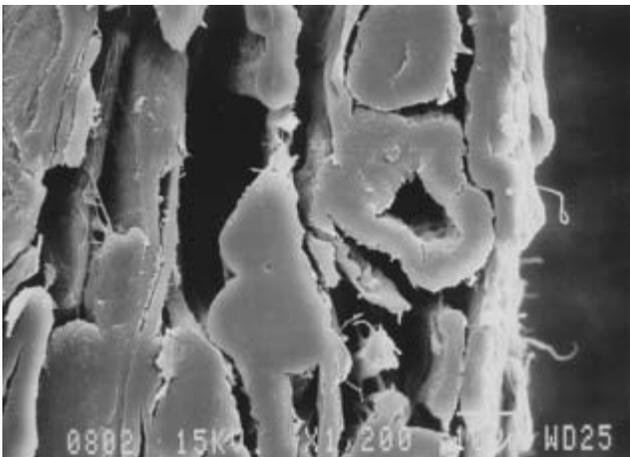


Figure 1. Magnified photo of deinked fiber from mixed office waste.

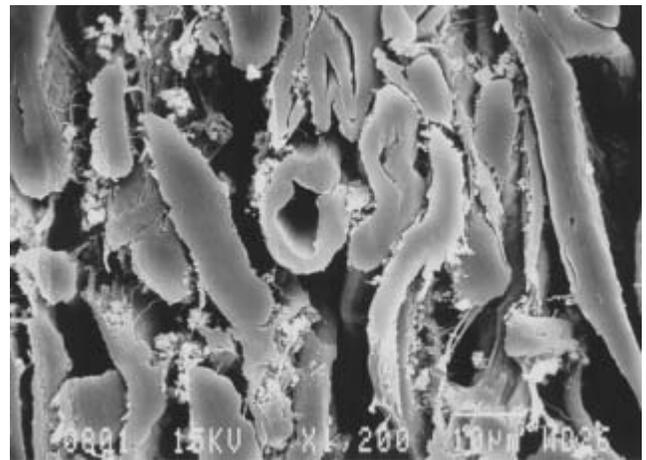


Figure 2. Same fiber with calcium carbonate added through conventional means.

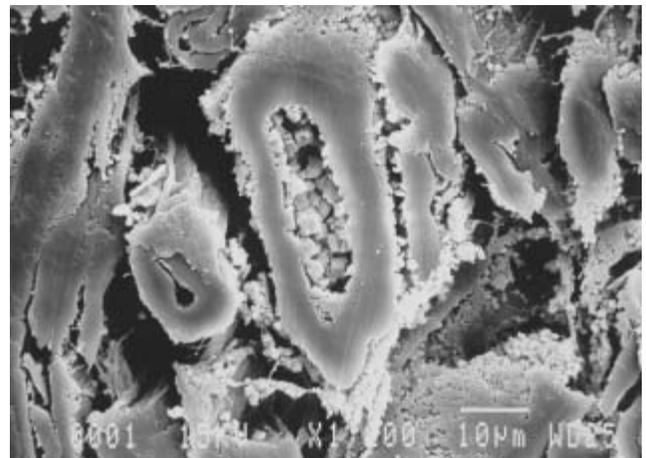


Figure 3. Fiber loaded calcium carbonate. Notice how the calcium carbonate attaches to the inside and outside of the fibers, forming a stronger bond.

