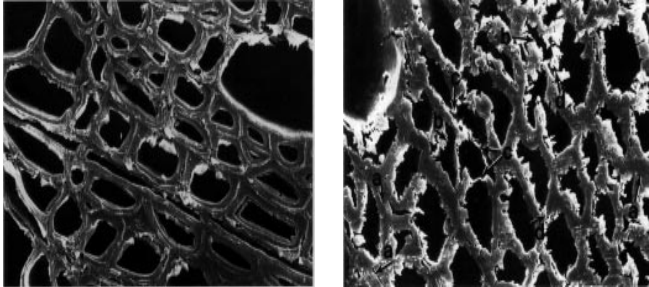


# TECHLINE

## Decay Processes and Bioprocessing

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### Biopulping: “Technology Learned From Nature That Gives Back to Nature”



Scanning electron micrographs showing intact wood cell walls (left) and cell wall modification due to fungal pretreatment (right).

Biopulping is the treatment of lignocellulosic materials with natural wood-decay fungi prior to thermomechanical pulping (TMP). The technical and economic feasibility of biopulping was established through two industry-sponsored consortia consisting of the USDA Forest Service, Forest Products Laboratory (FPL); the Universities of Wisconsin and Minnesota; the Energy Center of Wisconsin (ECW); and 22 pulp-and-paper and related companies. Current research includes the use of biopulping technology for kraft pulping of wood and pulping of nonwoody plants.

#### Advantages of Biopulping

- Reduced electrical energy consumption (at least 30%) during mechanical pulping
- Potential 30% increase in mill throughput for mechanical pulping
- Improved paper strength properties
- Reduced pitch content
- Reduced environmental impact

#### Industrial-Scale Process

The fungal treatment process fits well into a mill's woodyard operations. Wood is debarked, chipped, and screened according to normal mill operation. Then chips are briefly steamed to reduce natural chip microorganisms, cooled with forced air, and inoculated with the biopulping fungus. The inoculated chips are piled and ventilated with filtered and humidified air for 1 to 4 weeks prior to processing.

#### Process Economics

An economic evaluation has been performed for a 600-ton/day TMP mill. Capital costs to incorporate biopulping technology into a paper mill are estimated to be between \$5 and \$7 million. Savings of \$10 per ton of pulp may be realized with 30% savings in electrical energy, which results in a simple payback period of 2 to 3 years. Mills that are refiner limited may experience throughput increases of over 30% from the reduction in energy by refining at a constant total power load. A 20% increase in throughput results in savings of \$55/ton of pulp, with a payback period of approximately 6 months. If 5% of the kraft pulp is substituted by biomechanical pulps in a blend, an additional savings of over \$13 per ton of pulp may be realized.

#### Technology Transfer

A video on the biopulping process is available, as is a color brochure and numerous scientific papers. The technology has been licensed to Biopulping International, Inc., which has taken the lead in commercializing biopulping technology and supporting further research at FPL through a cooperative agreement.

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