RECYCLING "LOW VALUE" POST-CONSUMER FIBERS TO IMPROVE QUALITY AND REDUCE COSTS

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"LOW VALUE" POST-CONSUMER FIBERS MAY BE WORTH MORE THAN YOU IMAGINED.

THE ABITIBI CONSOLIDATED INC. PAPER MILL IN Steilacoom, WA, produces newsprint from recycled fibers. The mill has gained a competitive advantage by using fiber from unconventional sources. Their strategy is to identify potentially useful fiber sources using the concept of "attribute fiber buying." This approach avoids preconceived notions of fiber value, focusing instead on objective measures of fiber attributes. The idea is to select raw materials that meet the needs of the paper machines and the quality demands of the customer while minimizing costs.

PURCHASING THEORIES

Two principles have been developed to manage fiber procurement and optimize the value of purchased fiber.

1. Implement a system that manages fiber costs and fiber choices based on the cost/yield/quality to the paper-machine headbox. This approach also evaluates machine efficiencies and customer satisfaction with the final product.
2. Become the preferred customer of the suppliers you want to do business with.

Cost to the headbox

Attribute buying of fiber requires an understanding of the tradeoffs involved with each fiber choice. The paramount concerns are the paper-machine requirements and the needs of the newsprint customers. It is important to test the current fiber mix to determine attributes and synergies. And shopping for attributes in the marketplace is a must. The attributes we use as evaluation criteria are: fiber length, freeness, stickies content, inks, fiber distributions, synergy with other fiber choices, yield, and conversion costs. Evaluation of data in "design of experiments" testing will yield the information needed to make intelligent choices about fiber attributes and the tradeoffs involved. Finally, and most importantly, fiber procurement from new sources is a challenge to the status quo. A successful program requires teamwork and a strong relationship between the fiber manager, the pulp mill, and the paper mill.

Post-consumer fibers

Processed recycled fiber. Processed recycled fiber (PRF) is a sludge material obtained from an office-waste recycle mill and used as a substitute for OMG/ONP (old magazines/old newspapers). The PRF product, as a furnish for deinked newsprint, has a patent pending. PRF brings unique attributes to the deinked furnish. PRF also challenges the paradigms on the use and value of sludge. The unique pulping properties of this fiber choice are discussed later in this paper.

Mixed residential waste. The current specifications for mixed residential waste (MRW) are less than 2% unbleachables—OCC (old corrugated containers) and boxboard—and less than 0.5% prohibitives. Of course, the actual mix of fibers varies, depending on the source. Examples of some of the mixes are 30% ONP, 30% OMG, 30% office waste or 25% ONP, 60% office waste. The challenge of using such furnishes is to deal with unwanted fibers and contaminants (toners and stickies).

Post office waste. Post office waste (POW) consists of undeliverable mail from the post office. Abitibi Consolidated is working closely with Weyerhaeuser, who supplies the mill with POW. This has become a successful furnish. The attributes and challenges of POW have required some innovative solutions to process this material into a quality pulp furnish for the paper machines.

Be a preferred customer

A "preferred customer" is one who the suppliers want to do business with above all other customers. The best

actions to take to achieve "preferred customer" status are:

- Prompt response to communications
- Weekly payment
- Positive conflict resolutions
- Integrity
- Explore win–win opportunities.

"Attribute fiber buying" requires an analytical approach to a complex sourcing strategy. Despite the complexity, the rewards can be substantial for mills that expand the scope of the sourcing process by considering unconventional alternatives. The key is to evaluate potential fiber sources based on their attributes, the cost of delivery to the headbox, and product quality. When a mill identifies a new source of usable fiber, the next step is to stabilize the supply by developing a "preferred customer" relationship with the vendor.

USAGE THEORIES

Once a mill identifies a potentially useful fiber source, the work of solidifying the fiber supply begins. The mill and the vendor's fiber-procurement manager must develop a relationship of mutual respect. A reciprocal working atmosphere is essential, and the mill must be flexible enough to work with the vendor.

Alternative furnishes

There is a wide variety of grades and sources of alternative fiber. Each furnish has different challenges and twists that a creative engineer will find fascinating. Rather than making specific recommendations, we will simply suggest a general approach based on a few of the alternative furnishes that were proposed by our fiber manager and the strategies used for each of them.

Processed recycled fiber. PRF was sourced from a nearby landfill used by a fine-paper company. That mill produced both virgin and recycled office grades and had been using the landfill for disposal for nearly a decade. After examining a sample, it was evident that the waste contained usable fiber. Instead of dismissing this material as landfilled sludge, we adopted the attitude that "we will figure out how to use this material." The first step was to establish the attributes of the fiber to see how it could be used in our process. Since there is usually no published data on how to process unusual materials such as this, one must be familiar with both the mechanical and chemical requirements of the furnish.

The landfill was core sampled, and handsheets were used to determine fiber strength characteristics. Test results showed that the fiber integrity remained consistent throughout the landfill, even though the appearance did not. Next, chemical analysis was performed to ensure the fiber would attain FDA approval (it did) and to determine the characteristics associated with the furnish. In this case, they included toner and a heavy-metal content.

Because the furnish was to be processed through an existing newsprint-deinking pulp plant, some modifications were required. Screens were adjusted for fractionation, and chemistry was altered to deal with heavy metals and catalase (a peroxide-reducing enzyme produced by bacteria). The cleaners also were altered to be more selective to toners. Higher dissolved solids were dealt with through purging of water or the use of bentonite clays. Bleaching sequences also were altered to take advantage of the fact that some of the furnish was mechanical-fiber free. Working closely with both mechanical and chemical vendors resulted in several modifications, or new products, to help us deal specifically with PRF.

The increase in kraft/chemical fiber content eliminated the need for virgin kraft in the mill. In addition, the PRF is more uniform than OMG, since it is 100% chemical pulp, whereas OMG contains 0–100% chemical pulp.

Mixed residential waste. With our strategy of going down the food chain, MRW was a good fit. There were several concerns, chiefly about contaminant loading. We found that the stock was so heavily laden with bottles, cans, and plastic that it simply plugged the screens. We got around this by metering in the MRW with No. 8 wastepaper, which reduced the trash loading to the screen. The problematic cardboard content was controlled by fractionation. The stiffer, longer fibers can be removed in screening stages downstream if the right environment is provided.

Post office waste. The prospect of using the stream of undelivered mail initially caused quite an uproar with the papermakers. There were fears of stickies and blackies of unsurmountable proportions. However, once it was sorted, we found approximately 30% groundwood, 30% office waste, and 40% actual POW. We discovered that the envelope glues were not very tacky when put into a solution and resolidified. After discussing the characteristics of the glue with the glue vendors, we were able to deal with it. The low trash loading and the high content of office waste enhanced the pulp quality.

Net results

Using the three alternative sources—PRF, MRW, and POW—the chemical pulp content of the recycling plant's furnish jumped from 10–12% to 60–70%. Increased freeness, higher brightness, and lower variability have improved our pulp quality. By using the appropriate chemistry and equipment, we have also been able to lower our ink counts. In addition, the chemical pulp-

ing is handled differently, reducing chemical demand in the pulper.

SUMMARY

Through the use of alternative fibers, we have lowered our costs while producing a higher-quality pulp for our customers. We are also insulated from dramatic swings in the supply of raw materials while reducing the variability of incoming raw material. Are there problems using alternative fibers? Of course there are. But they are not insurmountable, and there are appreciable rewards for those who take the initiative to tackle the problems.

The proper blending of human resources is infinitely more important than the source of raw materials. The fiber manager, engineers, and operators all need to strive for the same goal. **TJ**

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