

True-Neutral Deinking

Katahdin Paper Company's East Millinocket, Maine mill switches to a new technology with ONP/OMG furnish and reduced chemical costs while stabilizing deinking operations. — By Herman Morrow, Bob Horacek, Kevin Hale, Scott Rosencrance

In March 2004 Katahdin Paper Co.'s uncoated groundwood paper mill in East Millinocket, Maine, became the first ongoing true-neutral deinking facility in the world using old newspapers (ONP) and old magazine grade (OMG) recovered paper furnishes.

During the past year and a half of operations with the new true-neutral process, implemented in cooperation with its developer Kemira Chemicals Inc., the mill has significantly reduced pulping and bleaching costs by completely eliminating the usage of several chemicals, while maintaining pulp quality, yield, and production. Switching to true-neutral has also improved deinking process stability compared with the alkaline process previously used at East Millinocket.

Katahdin, purchased out of bankruptcy in April 2003 by the Brascan Financial Group and managed through an agreement with Fraser Papers Co., operates two directory grade paper machines at East Millinocket and one SC-A/SC-A+ machine at its nearby Millinocket, Maine, mill. It produces some 280,000 tpy of newsprint and directory papers as well as 185,000 tpy of SC-A and SC-A+ papers. The company has 550 tpd of stone groundwood and 300-350 tpd of recycled capacity at the two mills.

Neutral Deinking

The concept of neutral deinking and its related benefits have long been recognized. Patents date back to the 1980s, and most mixed office waste (MOW) mills converted from alkaline pulping conditions to neutral in the 1990s. Deinking at reduced pH with ONP and OMG furnishes, however, introduces significant challenges not present with MOW deinking, especially associated with ink release in the pulper and collection efficiency in the flotation stage.

ONP/OMG inks are completely different and have always presented an obstacle to neutral deinking that previously could not be overcome. Many attempts at neutral deinking with ONP/OMG furnishes have been made through the years. Most of these attempts have actually been "low-alkali" or "near-neutral," with pulper pH only in the 8.2 – 8.5 range. Very few of these reduced-alkali attempts have been commercially successful.

The primary benefits of true-neutral deinking can be substantial, including significantly reduced chemical costs (typically ranging from \$2-\$5 per ton) due to the elimination of caustic, peroxide, chelant, biocide/catalase control, and all or part of the sodium silicate from the pulper. Often, all or part of the sulfuric acid normally used prior to hydro-sulfite bleaching is also eliminated. There are other related advantages as well, since several of these eliminated chemicals have serious safety and environmental implications.

The quest for neutral or low-alkali deinking at ONP/OMG mills has been increasing recently, partly due to the highly competitive newsprint market in North America and the need for mills to reduce costs wherever possible. In an effort to meet market demands, several chemical suppliers and research institutes have worked on development of neutral type deinking technologies for use with ONP/OMG wastepaper. The predominant activity has been in low-alkali deinking approaches utilizing sodium sulfite as a primary component in the pulper.

Kemira has developed and is currently commercially supplying both true-neutral and low-alkali deinking technologies that contain no sodium sulfite whatsoever. This offers improved performance as well as increased savings potential compared with deinking technologies that require sodium sulfite. The sulfite-free approach also eliminates the additional salt burden that can be a problem in some mills.

The Lionsurf NR neutral and low-alkali deinking technologies utilize a two product approach. One product is tailored to provide ink release and anti-redeposition while the second product is tailored to provide ink collection and removal. Dosage rates and ratios of the two products can be adjusted easily to fit a particular system and conditions and to enhance the overall deinking process quality.

East Millinocket Process

Kemira introduced this new deinking technology to Katahdin Paper in early 2004. Katahdin has a long history of deinking, being one of the earliest ONP/OMG mills to install a deink plant utilizing froth flotation cells in North America in 1992. Katahdin also is one of very few mills that

have the additional challenge of regularly using newsprint with flexographic inks as part of a daily wastepaper furnish.

Katahdin quickly moved forward to commercial trials under the true-neutral pulping conditions in March 2004. The trial started with an aggressive step change in chemistry, eliminating caustic, chelant, peroxide, and sodium silicate, and changing the existing Kemira alkaline deinking surfactant product to the new neutral program.

Figure 1 below shows the dramatic decrease in dump chest pH at the start of the trial. It also reveals an observation that pH is much more stable under neutral conditions.

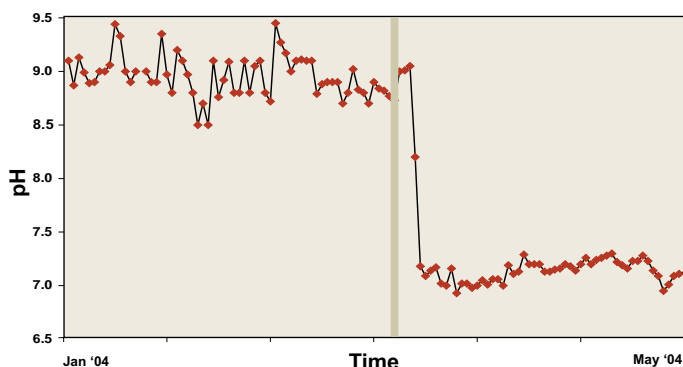


Figure 1. Dump chest pH decreased dramatically and stabilized under neutral conditions at the start of the trial at Katahdin.

As with any low-alkali or neutral technology, deinked pulp brightness was slightly lower initially (about 1 point) than traditional alkaline as a result of totally eliminating the peroxide bleaching agent from the pulper (see Figure 2 below). With a subsequent increase in hydrosulfite, this was equalized, however, so that final deinked brightness was the same under neutral conditions as the alkaline deinking conditions.

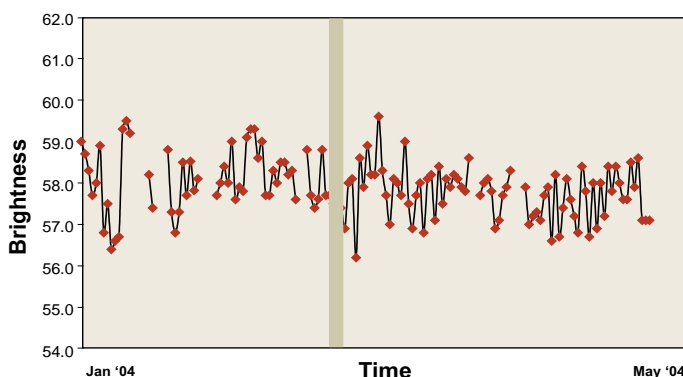


Figure 2. Brightness decreased slightly (about 1 point) when peroxide was eliminated from the pulper but, with a subsequent increase in hydrosulfite, returned to the same level under neutral conditions as under alkaline conditions.

With running time and continued optimization of both deinking and bleaching, results have improved even further. Typically, the high brightness grades are still made using the same amount of hydro bleach that had been used previously under alkaline conditions.

Similarly, deinked pulp ERIC (Estimated Residual Ink Content) numbers were slightly higher with the change to neutral, by about 20 – 40 ppm (see Figure 3 below). Again, however, with fine tuning and optimization during the past 18 months, this has also improved such that ERIC numbers are in the same range as under previous alkaline conditions.

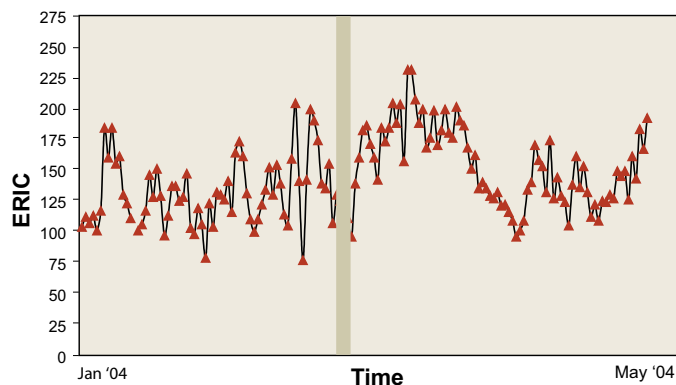


Figure 3. Fine tuning and optimization during the past 18 months have returned ERIC numbers to the same range as under previous alkaline conditions.

In addition to maintaining deinked pulp quality, the mill also observed that the deinking process itself tends to be more stable using neutral chemistry, and has less periodic fluctuations. Yield was not affected by the change to neutral conditions. There was no impact or negative interaction from the change to neutral deinking on either the mill's newsprint or 18-lb directory grade production. As an additional benefit, less anionic trash was carried over to the paper machine.

Other chemical usage was also reduced by using the neutral technology. Lower pH greatly affected polymer addition to the dissolved air flotation (DAF) clarifiers in the system, allowing a reduction of almost 75%. In addition, clarified water turbidity improved significantly, enabling reduced flow to the clarifiers. Finally, polymer addition to the sludge thickeners was reduced by about 25%. The mill also ran for several months using absolutely no sulfuric acid to adjust pH prior to hydrosulfite bleaching.

After 18 months of true-neutral, non-sulfite operation, with comparable results to alkaline conditions, Katahdin continues to demonstrate that long-term success can be achieved when using the new neutral deinking technology. This new technology has also proved to be effective in several other mills since its first introduction at Katahdin. ■

Herman Morrow is deinking supervisor at Katahdin Paper Company. Bob Horacek is senior deinking application specialist, Kevin Hale is global deinking manager, and Scott Rosencrance is global R&D manager, all with Kemira Chemicals Inc.