Testing PaperSaver℠ on Acid Papers

Joe Zicherman, Ph.D.
CEO, Provenance, LLC
©2006 Provenance, LLC

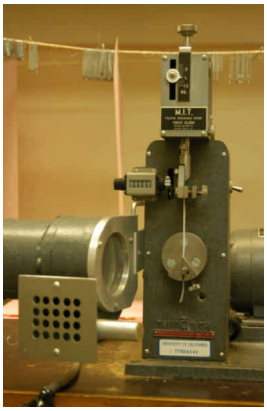
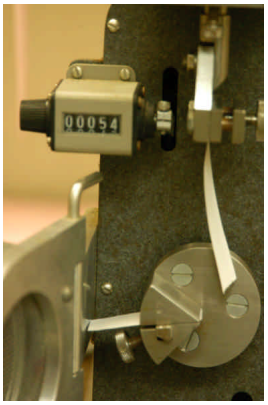
To discover how effective the PaperSaver formula is on acid paper, we did a series of experiments using methods that the Library of Congress pioneered to protect their archives and standards long used in the paper industry.

This involved taking papers that were first tested for their acidity and then treating some with the PaperSaver formula, leaving some untreated for comparison. Then, their fold strength—a measure of paper performance—was used to see how effective the PaperSaver treatment was. Fold strength is how many times a paper can be bent back and forth without breaking.

A variety of papers were used in these tests to evaluate the treatments, including different acid paper samples from two commercial sources and one from a local newspaper.

To simulate the effects of aging on the paper, paper samples were exposed in ovens at temperatures that would boil water. Throughout the weeks of testing, individual samples were taken out and tested to see how their fold strength decreased as time went by.

Some of this testing showed us that PaperSaver could be effective when applied to only **one side of acid-containing paper sheets.** Since that could result in a major savings in time and materials, we also included paper samples treated with PaperSaver – *but only on one side* - in this study.

MIT Fold Testing Equipment used to test PaperSaver's effectiveness.

What kinds of paper did we use?

The three paper samples in the study were:

- 25% cotton, 20-lb "fine business paper" produced by Southworth.
- 90 GSM, 24-lb basis, white woven paper produced by Crane's Crest.
- Printed paper from the San Francisco Chronicle dated June 19, 2004.

How we tested

After treatment, paper samples were cut into individual matched strips and placed in a temperature and humidity controlled room at the University of California, Berkeley, in the Forest Products Laboratory for 30 days.

This allowed us to test under uniform conditions and chemistry for the deacidifying agents that we used. The next accelerated aging was conducted using dry heat (100° C and < 5% RH).

After the 30-day conditioning treatment, the individual sample paper types were oven aged using either of two standard methods. The accelerated aging samples were removed weekly, reconditioned to standard conditions, and subjected double fold strength testing. [See Photos.] We kept aging samples until samples were reduced to a "zero or near zero" fold strength. In other words, until the samples wouldn't fold without breaking the paper. In all cases, the first samples reaching this performance level were the untreated controls. At the end of the test period the strength and performance values for the aged samples were compared with the same values for matched—*but untreated*—papers.

Results

To interpret results, we used Library of Congress [LOC] criteria to judge PaperSaver's effectiveness. PaperSaver formulations showed adequate enhancement for all papers treated and showed considerably better fold-strength when compared with untreated, aged paper. Over the course of the artificial aging period, Provenance showed considerably less aging as compared with the untreated samples. **A most noticeable difference was in yellowing which developed and was consistently observed in untreated samples but which was very reduced in the Provenance-treated samples.**

Should we spray one side or both?

We also wanted to find whether there was a difference in effectiveness if we treated one side of the papers with PaperSaver, or both sides. So we treated samples on either one or both sides, then subjected them to accelerated aging treatments and evaluated.

We discovered that single-sided applications had no significant difference compared to double-sided applications. These results show that it is unnecessary to spray both sides of paper to get an equivalent life extension factor AND savings in treating materials in normal weight papers. (Because heavy papers like matte boards are much thicker than normal weight papers, these *should* be treated on both sides)

While papers treated on both sides will show similar increases in pH on both sides, papers treated on a single side will show this pH increase only on the treated side. However, this does not mean that the paper has not been deacidified.

What's it mean?

The data we developed show that PaperSaver formulations provide a marked increase in the fold strength and lifetime of acid. Comparisons with other available deacidification treatments show that the PaperSaver formulations are as good or better than those treatments.

Importantly for crafters and scrapbookers, the tests also demonstrate that single sided treatments with the PaperSaver formulations are equally effective to double-sided treatments. This meaning you can use half the amount of PaperSaver to deacidify a sheet than if you sprayed both sides, which is a significant savings in time and materials!