Paper Splitting as a Preservation Option

by Margit J. Smith

Paper splitting has been practiced since the middle of the 19th century. In 1901 Douglas Cockerell, in Bookbinding and the Care of Books, writes that

“The paper to be split should be well pasted on both sides with a thickish paste, and fine linen or jaconet placed on each side. It is then nipped in the press to make the linen stick all over, and left to dry. If the two pieces of jaconet are carefully pulled apart when dry, half the paper should be attached to each, unless at any point the paste has failed to stick, when the paper will tear. The jaconet and paper attached must be put into warm water until the split paper floats off.”

In this instance paper splitting seems to have been carried out in order to arrive at two halves of paper with printing on both sides, each of which must have been needed in a different place. Or possibly, only one page of the printed matter was needed and the other side was discarded. No mention is made of reattaching the split sheets, or of any other use of the separated halves.

Edith Diehl in her book Bookbinding, Its Background and Technique, gives similar instructions adding only that the cambric (instead of jaconet) is to overlap the paper all around to facilitate separating the two parts. She also mentions that to remove the paper it is to be soaked in water and “...if left long enough in the water it will float off, but it should not be forced off.” She also does not mention another use for the split papers.

Since these two eminent bookbinding experts wrote their instructions, much has happened, and paper splitting has been brought to a high degree of sophistication with the newest mechanized paper splitting machine.
with the newest mechanized paper splitting machine. Now, however, the process is used mainly as a measure to preserve printed material that has become too brittle or too fragile to be handled safely. This works because the paper fiber links in the paper to be split are weaker through acid content, or outside influences, than the links produced between the paper and the carriers attached to each side with a specially formulated adhesive. When pulled apart the weaker paper splits neatly in the middle.

It is an astonishing process because very thin, very brittle paper can be treated in this manner, even paper with holes caused by iron gall ink corrosion. The two halves may be used separately, but most of the time at the end of the process, they are reattached after a strong, but very thin, reinforcement sheet of sheer tissue has been inserted between them. In this case the formerly brittle and damaged paper becomes much stronger and regains its original stability without losing even its watermark.

Paper splitting by hand is often carried out as a two-person operation, especially when it involves large sheets of printed matter. A well-trained team can possibly split 200 sheets per hour, whereas the paper splitting machine can manage about 2000 sheets per hour. The paper is split, reinforced with firm, flexible but strong paper, the two halves are reattached, dried and released from the carrier in a much-improved state. The once very time-consuming, labor-intensive and therefore very expensive procedure can be speeded up, and even after considering the cost of the machine, becomes economically feasible.

In the fall of 2000, while on sabbatical leave in Europe, I had the good fortune of observing paper splitting by hand at the Zentrum Für Buch-Erhaltung in Leipzig, Germany and I also saw the splitting machine. The Zentrum was working on an order from the French National Library, which had sent a shipment of roughly 40,000 sheets of 19th century newspapers to be split and reinforced.

The papers were slightly yellowed typical newsprint with some illustrations. I observed as a two-person team split these large sheets by hand; the timing absolutely perfect as they pulled the two halves apart at the same speed to prevent tearing the paper. This has to be well practiced and takes skill and concentration.

After splitting comes the attaching of the strengthening insert, and the realignment of the two halves; this step is carried out mechanically. Its most important aspect of course is the exact registration of the two pieces of paper. This “paper sandwich” then passes over a vacuum table which draws out the surplus glue and moisture, and is placed between blotters to dry. Once it is dry the two outside sheets of paper must be soaked off in an enzyme bath, that softens only the glue used to adhere the carrier papers, but will not soften nor dissolve the reattached paper.
Unfortunately, the paper splitting machine, which is about 25 feet long and over six feet high, was not in operation. The newspapers sent from France proved to be about one centimeter larger than the largest size that could be accommodated by the machine. The Svabian firm Becker Verfahrenstechnik (an engineering company in Germany) built this prototype for the Zentrum Für Buch-Erhaltung in Leipzig to the design and specifications of its technical director, Dr. Wolfgang Waechter. I was told by Dr. Waechter that this was the only machine of its kind in existence so far.

Not all preservation experts are in favor of treating deteriorating papers this way. It is, after all, a very invasive method of preserving the material. However it does go a long way to assure survival of important printed papers and of making them available to researchers in the future. Until a process is developed which will effect the same improvement in the quality of deteriorating paper, paper splitting will have its place among the preservation practices as they are used today.

A short note on the Zentrum Für Buch-Erhaltung: The mission of the Zentrum is to provide one site capable of carrying out every process of caring for, repairing, conserving, and otherwise making available for use again as many printed resources as possible, under one roof.

This concept was not easy to fulfill and the beginning years were difficult. The Zentrum “...originated as the Conservation Department of the German Library in Leipzig, but after 35 years of work in public service, limits had been reached which could only be overcome by a new organizational form.” The center began with seventeen employees and has now over fifty.

Providing one central location for any type of treatment needed by a wide variety of materials and the desire for physically handling materials as infrequently as possible have made the Zentrum successful and it is now fully self-supporting. It is located in a very modern industrial building in light, airy and superbly appointed rooms, with state-of-the-art equipment, work stations and storage areas with additional space already assured as part of its expansion program.

Treatment requests are received from libraries, museums, private collectors, institutions and commercial firms in many European countries. The Bavarian State Library sends all its material for paper splitting to the Zentrum. According to Dr. Waechter negotiations regarding a branch location in the US, possibly on the East Coast, were underway.

Lining up the carrier paper which is dissolved off later at Zentrum Für Buch-Erhaltung, Leipzig, Germany

BIBLIOGRAPHY


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When I joined the Conservation Services Staff at the University Library, the University of Michigan, I found all my pre-conceived definitions of “pamphlet” swept aside in favor of a simpler test: here a “pamphlet” is a bundle of print on paper, either unbound or soft-cover bound, that is one-quarter inch thick or less. This definition is purely pragmatic, as so much must be in a unit charged with overseeing the physical well being of a research collection that tops seven million volumes. It derives from the practical observation that a text block one-quarter inch thick or less is difficult to rebind by traditional binding methods and therefore alternatives have been developed.

Indeed pamphlet binding has evolved its own decision trees and workflow. It overlaps both the in-house Book Repair operations and Bindery Preparations (the unit that routes books out to the commercial binder) but belongs wholly to neither. What follows is a description of work flow, decisions, and rationale for the treatment of pamphlets at Michigan—with a recognition that “our way” is only part of the whole sub-world of pamphlets in libraries.

When to Bind?
Pamphlets are one class of material that we routinely bind before the new volume is ever placed on the shelf. Unbound, the slippery little devils are difficult to keep in place. They slide behind or are crushed by their more robust neighbors. Thrown in a student backpack or down a book-return chute, the unarmed pamphlet is likely to become folded, spindled, or mutilated. Our Labeling Unit, when processing new acquisitions for the shelf, gathers together all publications one-quarter inch thick or less and ships them to Conservation Services by the tote full.

Despite the narrow definition of pamphlet, the pamphlets that come to Conservation Services show a remarkably wide variation of format. Some are pamphlets in the classic sense: a limited number of sheets folded and secured with staples or sewing through the fold. There are loose sheets of 8 1/2 by 11-inch office paper held together by a single staple in one corner. Many “pamphlets” are small paperbacks; the leaves may be attached just with adhesive or the paper may be folded in sections and sewn. Each “pamphlet” may be a single publication, a small series of publications (a group of newsletters, for example), or a single publication in several parts.

The Pamphlet Binder
While pamphlets without binders are quickly crushed on the shelf, library pamphlet binders themselves have often proved a source of damage to the material they are intended to protect.

Pamphlet binding for single-section folded publications is highly satisfactory: a few stitches with wire or thread through the fold can attach a durable hard cover to the pamphlet without significant damage to the original soft cover. The binding can be undone simply by cutting and pulling out the stitching. When necessary—after water damage to the binder, for example—it is a simple process to rebind. Pamphlets in multiple sections that were originally sewn can with practice be manipulated into a pamphlet binder by stitching through the first and last sections. (See references below for sewing techniques.)
Pamphlets in single sheets (loose sheets or originally adhesive-bound) are less satisfactory. The text block can be side-stapled into a pamphlet binder. As long as the paper is in good condition, damage to the original publication caused by the binding is limited to the stab holes of the staples, but the binding is tight. It fights the reader and it fights the photocopier. The user responds by forcing the pamphlet open and weighting it to hold his place. Once the paper becomes weak or brittle, it breaks along the line of flex. In recent years we have worked with our commercial binder to extend certain adhesive-bind structures to some of the narrower paperbacks in preference to side-stapling. All our side-staple pamphlets are screened for a minimum three-eighths inch of gutter margin to ensure that the bound text can be read.

Pam binders made with butterfly tape—two strips of gummed tape sewn together down the center, right side to right side, were an ingenious invention that has not proved satisfactory in the long term. All the stress of the pamphlet-to-binder attachment and of the movement of the pamphlet is concentrated on the spine of the pamphlet’s paper cover. Sometimes the gummed tape fails to stick adequately and other times it sticks only too well, damaging the original cover or creating a breaking line at the edge of the tape.

Supplies and Equipment
Pre-constructed pam binders. Evaluations of our in-house book repair unit have consistently shown that staff time is the most
expensive component of the operation. Our costs are made most efficient by taking advantage of pre-cut and pre-assembled parts prepared by outside suppliers whenever possible. Our specifications for pamphlet binders include:

- alkaline buffered board stock, 40–60 pt.
- C-grade (or better) spine cloth
- construction that conceals the stitching on the spine

The last requirement comes from experience that wire stitching or sewing that is exposed on the outside of the binding often does not hold up in use: either the stitching is worn off by rubbing, is deliberately picked apart by a curious reader, or (in the case of wire stitching) snags other material, resulting in damage either to the binding or to the other material.

Our jury is still out in the debate between clear-front (polyester sheet) and board-front binders. Clear-front binders are well liked by most of the managers at the libraries and by users (even academics, it seems, will judge a book by its cover when making selections at the shelf). Clear fronts do become scratched with use, occasionally crack or break, and have created some in-house controversy over where and how to attach the call number label.

**Thread vs. staples.** Best practice for pamphlets is to remove all existing staples from the pamphlet and to sew it, by machine or by hand, with linen or cotton thread. A simple three-hole sewing pattern (expanded to five or even seven for large books) holds the pamphlet securely in place with least damage. While a small proportion of our pamphlets are hand-sewn into binders, we long ago invested in a pair of floor-model wire-stitching machines to expedite a work flow that averages over 8,000 pamphlets per year. The stitchers use wire off a spool, cutting the wire to length for each “staple.” The wire we use is bethanized steel, which is steel coated with tin. Pure stainless steel is too brittle for the machine and galvanized steel or copper wire quickly degrades. Round wire is used for saddle-stitching, flat wire for side-stitching.

**Wire-stitching machines.** Several of the archival supplies companies sell table-top staplers for pamphlets. Search directories under “printing equipment” and “bindery equipment” for the larger wire stitchers. Make sure that the machine will permit both saddle and side stitching.

**Work flow**

All publications one-quarter inch thick or less are sorted out into totes for pamphlet binding. Staff at the Labeling Unit, the Stacks Office, or tech processing areas of the branch libraries identify potential...
pamphlet binds; Bindery Preparations and Book Repair Staff also watch for and re-route pamphlets. As they are received totes are labeled by library and by date, to facilitate a first-in, first-out workflow.

The technician in charge of pamphlet binding selects the tote with the earliest date and sorts the pamphlets.

Sort by size: A simple sizing jig helps select the appropriate standard-sized binder for the book. The jig is an eighteen-inch square of binder's board with portions of wooden yardsticks glued on two adjacent edges to make stops. The binder sizes are ruled off with indelible markers and color-coded to make it easier to distinguish adjacent sizes. Pamphlets are fitted to binders that are the next size larger than the text block, allowing for at least one-eighth-inch squares. Our smallest binders are 7 1/2 inches high. Pamphlets smaller than seven inches all automatically go in 7 1/2 inch binders (stapled so the pamphlet is one-eighth inch from the bottom of the binder and the excess binder is all at the top); otherwise tiny pamphlets get lost on the shelf.

Sort by bind style: the technician then slips each pamphlet into a binder and stacks the binders, sorting through-the-fold pamphlets into one stack and side-staple pamphlets into another. Throughout these procedures the technician is on the watch for special problems. The pamphlets are then stapled with two, three, or more stitches depending on the height of the piece. Stitches are spaced two to four inches apart.

Narrow margins: a pamphlet needs at least three-eighths inch clear gutter margin for side-stapling into a binder (saddle-stapling does not interfere with the gutter space). Pamphlets with insufficient margin for side-stapling are handed over to Book Repair Staff for adhesive binding or to be placed in a pocket attached inside a binder.

Spiral binds: if the original pamphlet is spiral-bound or comb-bound, the spiral or comb must be cut off. Sometimes there is sufficient gutter margin to guillotine the holes off and then staple the pamphlet into a binder. (The paper will break down quickly if it is forced to flex along the line of holes.) If the margin is insufficient, the book is transferred to the Book Repair unit for adhesive binding.

“At the San Francisco Public Library we have an extensive permanent Music Score collection. The majority of the sheet music is bound in the spine-wrap binders. The spine wrap not only hides and protects the paper covers but it ensures that the item will not fall out of the binder when sections or pages become loose or detached. I find that the dense Archival Board, the C-1 cloth and 20 pt. clear cover hold up well with the music users. We also use the binders for other pamphlets and thin materials in the collection and for regular and oversize Government Documents, which receive little use but need long term preservation protection. In addition, the spine wrap binders can be reused once a popular monthly magazine issue is out of date. I choose Archival Product pamphlet binders for the quality of the materials to protect the life of the material, be it a score, a play, poetry pamphlet or a Government Document.”

Marie Kelser
San Francisco Public Library
Preservation Unit Manager
Tears: if the pamphlet cover or pages are torn up the spine folds, it is handed to Book Repair to mend the tear with tissue before binding.

Brittle paper: the pamphlet is routed to Book Repair for adhesive binding or to be placed in a pocket binder. Some weaker materials can be hand-sewn with a loose guard of heavy Japanese paper folded into the center of the section.

Time and Staff
A 1994 time and cost study of our in-house staple binding operation found the average time per item was four minutes. Time included sorting, stapling the pamphlet into a pre-assembled binder, and minor interruptions such as adjustments to machinery, minor restocking of supplies, and short consultations on problem pieces. No significant difference was found between processing times for saddle and side-stapled pamphlets. Over the past fifteen years the unit output has ranged from 7,500 to 12,500 pamphlets per year. The operation has been staffed by approximately .5 FTE student assistants supervised by the Book Repair unit. More recently staple binding has claimed part of a regular support staff position.

Binding for the Long Haul
Once a pamphlet is secured in a sturdy binder, very rarely does the binding fail. Occasionally pamphlets have been water-damaged and we replace the binder. Occasionally a pamphlet is deliberately pulled out of the binder by a reader who finds the binding too restrictive. Overwhelmingly, investment in pamphlet binding is a long-term protection for the book.

GLOSSARY
sewn: leaves attached with thread
stitched: leaves attached with wire staples
saddle-sewn: saddle-stitched: leaves secured through the center fold
side-sewn, side-stitched: leaves secured by passing thread or staples through the entire thickness of the book near the binding edge
stab-sewn, stab-stitched: = side-sewn, side-stitched


RESOURCES ON PAMPHLET STRUCTURES AND SEWING

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