VOLUME 11
No.4

Archival Products NEWS

Stabilizing Materials in Preparation for Transfer to Remote Storage: Managing Workflow and Costs

by Jennifer Hain Teper

Introduction

BEGINNING IN THE FALL OF 2002, The University of Illinois at Urbana-Champaign's (UIUC) Library began preparing materials for transfer to an off-site high-density storage facility. Currently, approximately 100,000 volumes have been transferred to a temporary storage facility and another 143,000 volumes have been prepared for transfer, but still reside in the Library's Main Stacks. Both sets of prepared materials will be transferred to the new high-density storage facility upon its completion in the fall of this year. In planning for the preparations and transfer of these materials, the Circulation Unit and the Conservation Unit conducted significant research on how best to prepare materials, focusing on predicting labor and material costs to care for the collections being transferred. Although the librarians undertook an extensive search of the literature, they discovered very little information on physically preparing materials for transfer. Few articles touched upon stabilization and physical transfer and fewer still discussed these topics with an eye towards modern preservation and conservation standards. One of the few related articles, however, appeared in a previous issue of *Archival Products NEWS*. Oliver Cutshaw's "Helpful Hints for the Safe Transport of Library Materials," highlighted Harvard University's practices for transporting library materials safely, and cited the Harvard website for preparing materials for offsite storage[1]. Although exceedingly helpful, Cutshaw's piece did not provide the time and cost studies

Supervisor Cloteria Easterling assists a student search an item on the OPAC.

The Circulation Unit and the Conservation Unit conducted significant research on materials and costs.

Students working at the shelf preparing materials for transfer.

Various stabilized materials awaiting shipment to high-density storage.

Simple repairs such as page mends and tying books with cotton twill tape were performed at the shelf, while all other repairs were pulled and completed in batches by student workers.

necessary to plan the preparation of hundreds of thousands of volumes per year for transfer. To derive this information, the Assistant Circulation Librarian and the Conservation Librarian undertook a study in the spring of 2003 to establish cost and time estimates for the many necessary steps taken during these preparations. This information will help guide other institutions in planning the financial and staffing commitments necessary to stabilize materials in a similar manner.

Condition Assessment and Stabilization

As monograph or serial titles were selected for transfer, circulation staff completed any necessary updates to its electronic record and conservation staff assessed all items for damage and durability. When time and space permitted, the project team performed the conservation assessment and stabilization in a centralized staging area before packing them for transfer. However, due to limited space, this assessment often took place at the shelf in the Main Stacks. In this case, students identified books slated for transfer by brightly colored streamers placed inside the front cover of each monograph or from pick lists of serial titles and call numbers slated for transfer. Although possible to complete stabilization in the stacks, the project determined that stabilization is performed much more quickly in the centralized staging area, due in large part to the increased time required for stabilization teams to locate streamered materials at the shelf.

During conservation assessment of materials, students pulled each book from the shelf and inspected it using the following guidelines:

- Are there any immediate problems with the book overall, such as mold, water or insect damage?
- If hardbound, is the cover loose, detached or missing? Is it providing adequate protection to the textblock?
- If bound in leather, is the leather powdery and dry to the point that it will rub off on adjacent materials?
- If paperback, is the volume either under 3/8 of an inch thick or incapable of standing on the shelf without pronounced slumping?
- Are there any loose or detached pages in the text block?
- Is the sewing or adhesive of the textblock intact?
- Is the paper shattered or fracturing due to severe embrittlement?
- Does the volume otherwise present any shelving problems due to its condition?

Based on the answers to these questions, conservation staff performed a series of simple repairs to stabilize materials. Simple repairs such as page mends and tying books with cotton twill tape were performed at the shelf, while all other repairs were pulled and completed in batches by student workers. During assessment, students were also trained to safely remove all unnecessary artifacts from the book that could cause further deterioration or damage including paperclips, loose papers not related to the item, old (acidic) binding slips and Post-it Notes. Due to the high quantity of materials being assessed, all attempts were made to minimize supply costs and labor when completing any stabilization or repair. To do this, repairs were limited to the following types: tip ins, page mends, string ties[2], envelopes, phase boxes, paper wraps with string ties[1] and miscellaneous other repairs such as fused pages and mold or insect infestations, many of which were treated in the conservation lab by staff.

Cost estimates for assessment and repair were derived from a weeklong time study performed in the spring of 2003 tracking student work speeds for both assessment and repairs. In a typical day, a student could assess 150 books per hour, while performing a limited number of minor repairs at the shelf and pulling the more complex repairs for treatment in a designated repair station. Based on the fact that a student assessed approximately 150 books an hour, at a pay rate of $5.85 per hour, the cost to assess each book equalled approximately $0.039 per book. It should be noted, however, that the student times recorded were for well-trained students who had been working in this capacity for over eight months at the time of the study. Less seasoned workers would, obviously, work at a slower pace.

From the monthly statistics collected over the preliminary 10-month period, the percentage of the overall collection needing stabilization fluctuated between nine and twenty percent, with an average of 13.66%. Of the items that need some form of stabilization, Table 1 shows the likelihood of each type of repair occurring and the approximate costs in both supplies and labor for each.

Transferring and Cleaning Materials

Once materials were assessed and stabilized, personnel packed them into plastic shipping totes or cardboard boxes and transferred the items to the storage facility where they were cleaned and accessioned. At the time of this writing, delays in the storage facility's opening restricted the library to transferring only 41% of the total items processed through condition assessment and stabilization. However,

Cost estimates for assessment and repair were derived from a weeklong time study performed in the spring of 2003 tracking student work speeds for both assessment and repairs.

Table 1

Occurrence of Repairs During First Ten Months of Preparations

REPAIR	PERCENT OF OVERALL MATERIALS	PERCENT OF ITEMS BEING REPAIRED	COST FOR LABOR ($0.10 PER MINUTE)	COST FOR SUPPLIES	TOTAL COST PER REPAIR
String Tie	2.05%	15.01%	$0.20	$0.05	$0.25
String Tie with Board	0.12%	0.91%	$0.50	$0.45	$0.95
String Tie with Wrap	0.86%	6.33%	$1.00	$1.01	$2.01
Tip In	0.34%	2.46%	$0.50	$0.01	$0.51
Page Mend	0.55%	4.03%	$0.20	$0.05	$0.25
Envelope	9.59%	70.22%	$0.60	$0.34	$0.94
Envelope with Board	0.03%	0.19%	$0.80	$0.74	$1.54
Phase Box	0.07%	0.51%	$4.39	$3.11	$7.50
Other	0.05%	0.33%	$1.50	$0.20	$1.70

From these figures, an average repair cost per volume for the total number of volumes transferred was found to be approximately $0.123[3].

Students packing stabilized materials in the staging area.

During the time period that materials were shipped, several different approaches to packing materials were tested for an ideal combination of economy, security of the materials and ease of transport and storage.

some time and cost estimates were measured before the temporary storage site was filled, providing us with a basis to estimate further expenses. An experienced student can pull streamers from items and pack approximately eight totes or boxes per hour, with each tote/box holding an average of 42.2 volumes, for a total of approximately 338 books per hour. At a pay rate of $5.85 per hour, this process cost approximately $0.017 per item.

During the time period that materials were shipped, several different approaches to packing materials were tested for an ideal combination of economy, security of the materials and ease of transport and storage. Although the project initially began using plastic shipping totes and foam padding, these materials did not meet with great success under our space and volume needs. Totes, though very sturdy and reusable for many years, necessitated a great deal of storage space when empty. Similarly, sheet foam that was initially used to pad the boxes and fill any spaces in the box was also found to be cumbersome to store. When combined with the fairly high cost for each of these materials, other options were rapidly investigated. During periods of high shipping volume, the library utilized heavy weight cardboard boxes in addition to the plastic totes. Although the heavyweight, double-walled cardboard boxes did not hold up as long as the plastic totes, they can be broken down when not in use. In lieu of foam sheeting to fill voids in packed boxes, the packers used crumpled, recycled office paper to fill small spaces and crumpled unprinted newsprint for large spaces. Although the plastic shipping totes will be utilized during the more normalized, slower shipping volume projected in the future, experience demonstrated that very little damage is incurred from a lack of the layer of foam for "shock absorption" purposes. Consequently, foam will only be used when shipping containers of brittle or rare materials.

Conclusion

This case study not only provided the Conservation Unit with reliable data based on UIUC's specific situation and highlighted some areas of the processes that could be streamlined and economized, but also revealed several insights into the process that could be helpful for others currently or soon to be contemplating similar projects. While the monetary values arrived at may be useful as guidelines for others, the needs and capabilities of each institution will invariably alter the procedures and speed by which these processes can be accomplished. What is important for all libraries considering off-site storage is the important role preservation should play in the preparation for transfer of materials and the necessary time and costs that go along with that role.

NOTES

1. Oliver Cutshaw, "Helpful Hints for the Safe Transport of Library Materials," *Archival Products NEWS*, 9, no. 3 (2002): 4-6; Harvard College, "Conservation Guidelines: Transfer of Library Materials to the Harvard Depository," Cambridge: Harvard University [cited November 26, 2002]. Available from the World Wide Web: <http://preserve.harvard.edu/guidelines/hdtransfer.html>.

2. Since the initial presentation of this information, several universities undertaking similar stabilization efforts have recommended the use of pre-manufactured Mylar book jackets instead of buffered paper to contain red-rotted leather covers. The University of Illinois is currently investigating this alternative.

3. By combining the total cost per repair with the occurrence of each type of repair, an average cost of $0.903 was determined. Combining this figure with the percent of items needing stabilization (13.66%) reveals the weighted cost of stabilization for all items being transferred to be approximately $0.123 per item.

Jennifer Hain Teper is head of the Conservation Unit at the University of Illinois at Urbana-Champaign, Urbana, IL. She can be contacted by phone at 217-244-5689 or by e-mail at jhain@uiuc.edu

New Technology for Conservation Enclosures: The Kasemake KM503A Box Cutting Machine

by Jacob Nadal

From phased conservation to preservation enclosures.

PHASED CONSERVATION WAS originally proposed as an interim preservation measure when reformatting or high-level conservation were not feasible due to resource constraints or inherent material problems. The importance of enclosures in conservation has only grown over the years from an interim measure to placing an object in a suitable enclosure as the final preservation decision. As enclosures have graduated from a stopgap measure to a standard part of the preservation toolkit, the enclosures' design as well as the time and resources spent on their construction have naturally come under closer scrutiny.

Research in enclosures has already yielded practical guidance, such as Hedi Kyle[1] or Lage Carlson's[2] books and tools like crimpers, measuring devices and corner rounders to facilitate production. Karen Brown reported in a previous *Archival Products NEWS* article on software to facilitate the layout of enclosures[3]. Now, AG Kasemake has adapted its Kasemake plotter system from the commercial packaging design industry to the realm of conservation allowing rapid production of custom enclosures[4]. This article will report on this system's capabilities and its incorporation into Indiana University Libraries' E. Lingle Craig Preservation Laboratory's work.

Fig 1: The Kasemake KM503A

AG Kasemake has adapted its Kasemake plotter system from the commercial packaging industry to the realm of conservation allowing rapid production of custom enclosures

The Kasemake and its products

The Kasemake system is primarily used in prototyping for the packaging and design industry and although it can produce a bewildering array of items, two enclosures stand out as the workhorses for the conservation community: a portfolio-style box similar to the traditional phase box and a drop-spine or clamshell style box with a pizza box construction.

The Kasemake itself is a large machine, 7.25 feet by 7.75 feet and weighing 940 lbs. It requires dedicated power supplies: a 220 v, 60 Hz line for single phase vacuum pump and a standard 110 v for the computer and table controller. Despite an imposing physical presence, the noise is moderated by industrial hygiene standards. Our lab registers 50 dbA on a normal day, and during operation the machine produces 65-70 dbA. Although this is well under the 85 dbA threshold for hearing damage, it is certainly noisier than most library environments.

A Computer Aided Design (CAD) program called AGCad directs the Kasemake. This software reads measurement and labeling information from an MS Access database, lays out the enclosures and optimizes the path the machine will take through the runs for cutting, creasing and labeling. The Kasemake operator must select the items for each run, size and position the label information and distribute the individual enclosure's layouts on the sheet to create a multiple box run.

The software can process any TrueType font for rendering by the pen tool. Because TrueType specifies a glyph's outline and relies on an output device to fill in the character, the resulting letters on the Kasemake are outlines only. This makes some fonts illegible. Labeling is also the most time consuming pass in constructing an enclosure, and the more complex the font the longer this process takes. Courier New has provided us with the best balance of readability and speed.

The Kasemake is equipped with a machine head containing oscillating and drag knives for cutting, rolling wheels for creasing and a pen for labeling. It can operate on numerous materials, but in conservation applications the most commonly used are paperboards up to 40" x 60," both solid core and corrugated.

The Kasemake is equipped with a machine head containing oscillating and drag knives for cutting, rolling wheels for creasing and a pen for labeling. It can operate on numerous materials, but in conservation applications the most commonly used are paperboards up to 40" x 60," both solid core and corrugated. At the Craig Lab, we have successfully cut 60 point grey/white board, 80 point binder's board, a wide array of papers, Tyvek, cloth and Mylar.

An important issue in evaluating the Kasemake production costs is the distinction between the time and materials used in the cutting, creasing and labeling one sheet of board (which contains several boxes) and the inferred time and materials cost of a single box. Although cutting time for an individual box is identical whether it is produced as part of a group or as a single item, there are several fixed costs that apply to the entire run. Limiting factors in assessing the production cost are materials handling, cost of one sheet of board which is fixed per run rather than per box and sending data between the AGCad software, the MS Access database and the Kasemake table. Well planned runs minimize these costs producing a lower cost per box.

Four-flap portfolios on 20 point solid core board can be produced at a rate of 100-120/day, 4 per sheet. Construction time is approximately 4 minutes per box, including lettering for titles and call numbers. The largest size possible for this box style, based on a 40" x 60" sheet and a book up to 3" thick, is 11" fore edge to spine and 18" head to tail. This style provides enough mechanical support to collate loose materials and stabilize items for their relatively mild life in off-site storage. The inexpensive materials are an incentive to use this enclosure style and the minimal increase in the item's size helps maximize storage space.

Clamshell boxes from 40 point solid core board or corrugated board can be produced at a rate of 80-120/day, 6-8 per sheet. Construction time is approximately 5-6 minutes per box. The largest size possible for this box style, based on a 40" x 60" sheet and a book up to 3" thick, is 28" fore edge to spine, and 45" head to tail. These enclosures offer much greater mechanical protection, but at a more expensive materials cost and greater space consumption.

One common call for enclosures comes from moving collections to off-site storage. For this purpose, it is exciting to see that both enclosures add less to the item's size than a standard grey/white phase box. The 6 layers of 60 point board in the traditional enclosure add .36" in depth, while the portfolio and clamshell from the Kasemake add only .1" and .12" respectively.

The Kasemake clamshell box offers significant mechanical advantages over the traditional grey/white phase box. The traditional phase box provides 1 layer of 60 point board around the volume's perimeter and leaves the enclosure's corners open to outside elements. Forces are fairly well

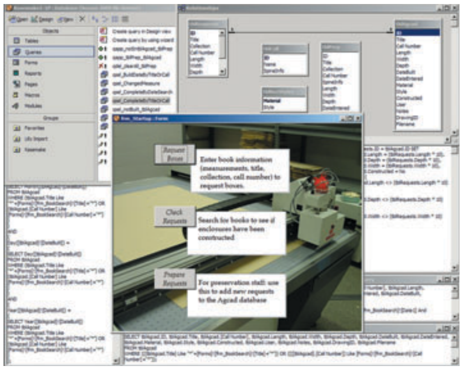

Fig 2: The MS Access database used to collect and process box orders.

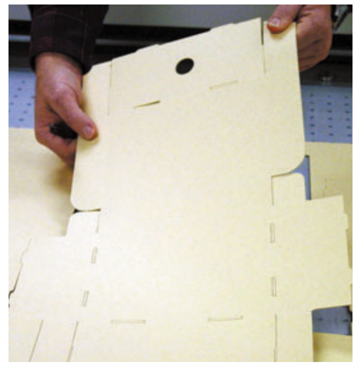

Fig. 3: Lifting a box out of the sheet at the end of a run.

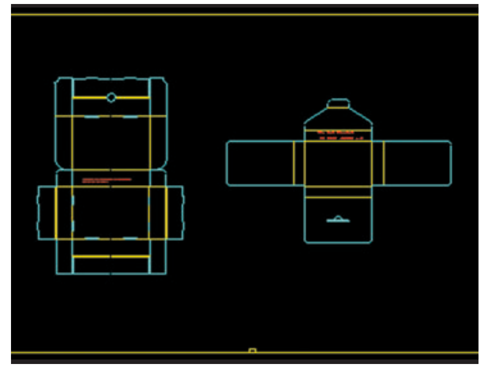

Fig. 4: Layouts for the two most common enclosures styles. Blue lines indicate cuts; yellow lines creases; red indicates labeling.

distributed across the flaps as long as fasteners are secure, but there is some tendency to buckle when applying force to the corners. The Kasemake clamshell crossed grains and folded structure allow for both shock absorption and rigidity from all directions, and provide 3-6 sealed 40 point board layers around the entire book's perimeter.

Fitting the Kasemake into a preservation program

When the Indiana University Libraries began planning their off-site shelving facility, it became apparent that we would need to provide low-cost stabilization to numerous materials in a short time. A pilot study determined that the string ties and envelopes would serve for many purposes, but also revealed many materials would need better stabilization due to their extreme fragility or inherent value as artifacts.

When the final figures were tallied, special collections materials alone would require 80,000 boxes to be produced. The entire move of our collections would require a 100,000 minimum. The Craig Lab[5] had already invested significant effort in improving its enclosures' workflow by using mass production methodologies and computer aids, such as those described by Brown[3]. This brought our average production time for the standard grey/white board phase box into the 20-30 minute range. At this pace, it would still have taken over 33,000 hours to complete this project. Since we were unwilling to condemn our conservation students to 12 years of ceaseless box making, it was obviously time to automate or outsource.

Bids were sought for production services as well as equipment. When all the factors were evaluated, the Kasemake KM503A emerged as the most economical tool for our enclosure needs. Since we began our box making projects on the Kasemake in November 2001, we have constructed over 35,000 enclosures. Based on our initial estimate for 80,000 boxes, we will have saved over $250,000 compared to the bids we received in 2001, and over $80,000 versus current custom enclosure prices.

We had several issues unique to the library preservation environment during our preliminary period. Several parts in our machine wore out due to unexpected stress from repetitive use. These parts might receive 5 or 6 uses per day in developing packaging prototypes, opposed to 60 to 100 in a conservation lab. AG Kasemake has replaced these parts and incorporated the changes into the new O-Head that is used in new Kasemake systems.

We also quickly exceeded limitations of the MS Access database supplied with the AGCad software. Our need to manage jobs from 19 libraries, deal with special projects

When all the factors were evaluated, the Kasemake KM503A emerged as the most economical tool for our enclosure needs. Since we began our box making projects on the Kasemake in November 2001, we have constructed over 35,000 enclosures.

We have also used the Kasemake in several other projects where we have needed a custom enclosure on short notice.

and create a steady workflow led to the development of a new in-house database (see figure 2). We also learned a crucial lesson in measuring. The Kasemake is very exact in its measurements and our habit of measuring tightly when making phase boxes by hand led to some enclosures that fit so snugly they created a vacuum inside the box. The hypothetical conservation advantages were outweighed by the resulting access restrictions. In some cases we had to actually cut the box away from the book!

We have also used the Kasemake in several other projects where we have needed a custom enclosure on short notice. We have adapted standard packaging designs and created our own designs to house diverse items such as compact discs, film cans, odd-sized music, manuscript materials, comic books, large rolled maps, a flowerpot and 53 display stands for fretless zithers. None of these projects was large enough to make outsourcing a cost-effective option and the ability to design and produce custom enclosures in-house allowed us to move from conception to completed project in the time it might have taken just to write a Request for Proposal (RFP).

Our needs in rehousing and managing a large research library collection made in-house production a sensible choice and a donor made the initial investment in equipment a real possibility. Fortunately, libraries with lower volume needs now have access to this technology without the high cost of an outright purchase through commercial binderies. Heckman Bindery, Inc. and ICI Binding Corporation have both invested in this equipment, making these enclosures available to a wide variety of institutions and for many applications.

FURTHER RESOURCES

1. Kyle, Hedi. *Guild of Bookworkers Journal.* 30:1 (Spring 1992).

2. Carlson, Lage, et al. *Boxes for the Protection of Books: Their Design and Construction.* Washington, D.C.: Library of Congress, 1994.

3. Brown, Karen. “Using Spreadsheets for the Phase Boxing of Books.” Archival Products NEWS, 11:1.

4. AG Kasemake conservation products website: http://www.kasemakecxd.com (last accessed 11/02/2004).

5. Harrison, Garry. “Enclosures.” *The E. Lingle Craig Preservation Laboratory Repair and Enclosure Treatment Manual.* Bloomington, IN: Indiana University Libraries. http://www.indiana.edu/~libpres/manual/enclosures.html (last accessed 11/02/2004).

Jacob Nadal is head of the E. Lingle Craig Preservation Lab at Indiana University, Bloomington, IN. He can be contacted by phone at 812-855-6281 or email at jnadal@indiana.edu.

Archival Products Launches a New Website

Archival Products, a Division of Library Binding Service, has revamped our web site to be more compatible with our 2004 catalog. We hope it will prove easy to view and navigate, resulting in less searching time for you and brimming with helpful information. We invite you to visit and peruse our website at www.archival.com to discover what it has to offer you.