

“Adhesive
Bindings...
Unconditionally
Guaranteed.”

Binders Can Now Say It.

Although the double-fan adhesive binding process was first imported to the United States in the mid 1950's, it was not until twenty years later that Mekatronics introduced it to the library binding industry and put it to effective commercial use.

The eighth edition of the Library Binding Institute Standard for Library Binding for the first time includes double-fan adhesive binding as an approved method of leaf attachment. While library binders have traditionally relied on the Oversewing method to produce a durable product, the addition of adhesive binding to the LBI Standard was necessitated by the increasing number of volumes with narrow binding margins, fragile paper, and/or no option to sew through the fold. The new LBI Standard thus puts added responsibility on the library binder to produce a quality product using a variety of leaf attachment methods. Because it is reasonable to expect that adhesive binding will become an increasingly prominent technology within the library binding industry, a review of the process and a study of the ingredients necessary to optimize its quality is appropriate at this time.

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Let us examine the essential factors which, when properly applied, will enable a binder to produce a durable product.

ADHESIVES

It is a well-known fact that the adhesive plays a major role in adhesive binding technology. The polyvinyl acetate (PVA) monomer was first patented in Germany and its commercialization in the 1930's also began there. The technology for producing an emulsion copolymer of an internally plasticized PVA does exist in the United States; however, its small consumption by the library binding industry gives little incentive for its domestic production.

When making a substitution, a binder seldom makes an accurate comparison between the alternatives. It is difficult for him or her to do so since they are not chemists and must, therefore, rely on their supplier. Consider the “mileage” factor only.

The specially formulated imported PVA adhesives have a “mileage” of approximately 2000 sq. in/lb. The best domestic adhesives have a considerably lower “mileage.” If, for example, a domestic adhesive is found at half the price of the recommended imported adhesive, but having only half the “mileage,” the end cost is the same for both adhesives. A 1” thick x 10” high volume, for example, will have an area of 10 sq. in. Approximately 200 volumes can be bound out of one pound of imported adhesive. At the prevailing small quantity price of \$1.85/lb., the adhesive cost per volume is less than one penny. One would question the wisdom of a substitution based on price alone without conducting careful tests not only relating to strength, but aging characteristics as well, in order to ensure durability.

To the best of our knowledge, the adhesives sold by Mekatronics and one other supplier are the only two specially formulated PVA adhesives imported into the U.S. for use in the double-fan binding process. Both have a proven track record of high performance and their continued use is strongly recommended if a quality product is to be obtained.

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EQUIPMENT

A variety of equipment is currently being used throughout the industry. This equipment ranges from homemade, hand-operated devices to semi-automatic machines. Before the relative merits of this equipment can be discussed, a few facts must be considered.

“...extreme care must be exercised to ensure that all pages are flush with the spine, and will therefore be tipped during the gluing operation.”

With the exception of the Ehlermann combination spine milling and double-fan

gluing machine or its equivalent, use of all other types of equipment must take into consideration the following:

When the spine of a textbook is milled or trimmed before being clamped for the fanning operation, extreme care must be exercised to ensure that *all* pages are *flush* with the spine, and will therefore be tipped during the gluing operation. Failure to do so may compromise the binding unless the spine is first “notched” as will be later described.

FANNING BY HAND

The most critical aspect of fanning by hand is the need to apply uniform pressure on the text block when it is being deflected in either direction to induce fanning of the pages. In most homemade devices the text block is clamped in a vice and is deflected by hand with the fingers exerting an uneven pressure and forcing the pages to assume a wavy pattern. This causes non-uniform penetration of adhesive resulting in an inferior product. When such devices are being used, it is recommended that uniform pressure be applied with a straight edge (such as a strip of wood). The best way to fan a text block by hand, however, is to use a vise with sloping extensions perpendicular to the jaws (as shown in Fig. 1). The text block is deflected so that the fanned pages are allowed to rest over the sloping extensions, which will counteract the uneven pressure exerted by the fingers.

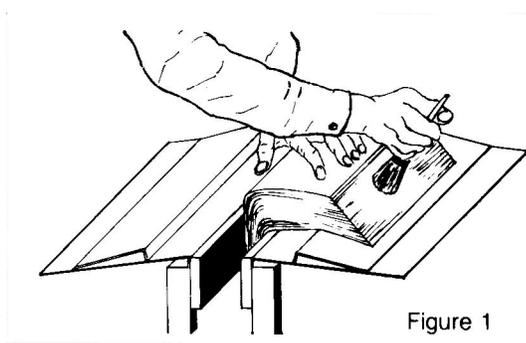


Figure 1

FANNING BY MACHINE

Fanning by machine does not pose the problems of fanning by hand, since the clamped text block is allowed to rotate in both directions against a spinning roller to produce a page-by-page fanning and tipping action. With the machine properly adjusted, this method assures the penetration of adhesive between each and every page (Fig. 2).

“The models that Mekatronics introduced ... have a milling unit attached to the gluing station... the leaves of the text block cannot slip out of alignment...”

Earlier models of the Ehlermann double-fan adhesive binding machine consisted of the gluing station only. Trimming or milling of the spine was done separately. When using this model, the recommendations made earlier with regard to jogging and notching should be carefully followed.

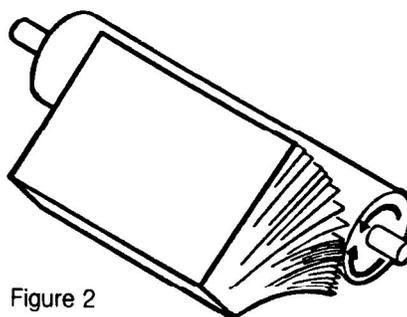


Figure 2

The models that Mekatronics introduced in the early 1970's are used by most binders because they have a milling unit attached to the gluing station, the leaves of the text block cannot slip out of alignment; thus consistent quality is ensured.

SPINE NOTCHING

Another well-known fact concerning adhesive binding technology is that spine preparation plays a key role, especially when a variety of coated, stiff and cross-grained papers must be processed. Milling cutters with roughers help to expose paper fibers to same degree for improved linkage with the adhesive. Also,

text blocks with heavy coated stock are sometimes double-fanned twice rather than once. These attempts at stretching the limits of the process in most cases result in weak bindings and a wide gap between the durability of sewn and adhesive bindings. The recently introduced **Mekanotch™** adhesive binding system bridges that gap.

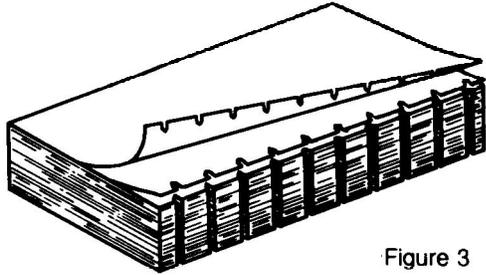


Figure 3

The **Mekanotch™** features adjustable spine notching patterns that increase the spine area and expose additional paper fibers to enhance the linkage between paper and adhesive. The following table illustrates the significant gains in gluing surface area obtained from various notching patterns (Fig. 3).

**GAINS IN GLUE SURFACE AREA
ACHIEVED THROUGH NOTCHING**

Mach. Cycles	Machine Cycle Time (Sec.)	Notch Interval (In.)	No. of Notches	New Gross Gluing Area (Sq.In.)	Gained Area (%)
1	5	.590	19	14.61	32.8
2	10	.295	38	18.22	65.6
3	15	.147	57	21.83	98.4

Text Block: 1" thick x 11" high;
Net Glue Surface Area = 11 Sq. In.

Notch: .080" wide x .125" deep.

The **Mekanotch™** makes it possible to successfully adhesive bind text blocks with coated, stiff or cross-grained papers. The machine is capable of notching several text blocks simultaneously up to a total of 5" in thickness, in less than 5 seconds. Because the heights

"...adjustable spine notching patterns... increase the spine area and expose additional paper fibers to enhance the linkage between paper and adhesive."

of text blocks vary, however, library binders usually notch each text block separately. Use of the **Mekanotch™** machine does, then, decrease productivity slightly, but results in a high quality product.

Binders use the **Mekanotch™** system in either of the following ways:

As a stand-alone system whereby the already-milled text blocks are notched in the notching station and then transferred to a gluer/ dryer station where they are double-fanned, glued, and "gravity-dried" (notches face up so that adhesive penetrates and coalesces). This method is typically used in European binderies.

As a companion to the Ehlermann double-fan binder, whereby the spines are notched first and then milled and double-fan glued. It is important to note that, in contrast to the traditional method, additional time must be spent in the gluing station to ensure that the adhesive is "forced" into the notches. (A brush or spatula can be used to work in the adhesive.) This method is typically used in American binderies.

SPINE LINING

The recommendations made above cannot stand alone as guidelines for producing high quality adhesive bindings. Proper spine lining is essential. A stretchable lining fabric (which runs the full length of the spine of the text block and overlaps the front and back end-papers by at least one inch) should be glued up before it is applied. After the adhesive has dried, lined-up volumes should receive an additional heavy coating of a less pliable PVA adhesive to permanently seal the lining material to the spine; and a second lining of strong cotton fabric. The added adhesive and

lining strengthen the volume, help retain the rounded and backed shape of the spine, and minimize stress when pages are flexed.

“Use of the Mekanotch system... makes it possible for library binders to unconditionally guarantee their adhesive bindings...”

Adhesive binding is a very demanding technology that leaves no margin for error. The eighth edition of the LBI Standard for Library Binding requires that binders produce adhesive bound volumes that have long-term durability. Use of the **Mekanotch™** system in conjunction with double-fan adhesive binding, accompanied by use of appropriate materials and techniques, makes it possible for library binders to unconditionally guarantee their adhesive bindings with confidence that the product upholds the standards of excellence traditionally set forth by the industry standard.

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