Formerly *The New Library Scene*

Hardcover Binders International
Library Binding Institute

SHELFLIFE

A PUBLICATION FROM HBI AND THE LIBRARY BINDING INSTITUTE

VOLUME 4 • ISSUE 3

4440 PGA Blvd. Ste. 600 • Palm Beach Gardens, FL 33410
561-745-6821 • www.hardcoverbinders.org

Library Binding Toolkit – A Handy Resource for Library Staff

by Chris Kieffer

Perhaps no written material receives more use and abuse than library materials. A typical library book may go through dozens and dozens of circulations and reach the hands of innumerable readers. Most book bindings, whether hardcover or paperback, are not meant to handle this sort of use over extended periods of time. Thus library materials present a unique challenge to bookbinders, one that certified library binders meet exceptionally well.

Once a certified library binder gets their hands on a book and binds it using the ANSI/NISO/LBI Library Binding Standard, Z39.78-2000, it is likely the book will never have to be rebound. These bindings are remarkably durable, but perhaps more important is the money libraries save by investing in a certified library binder. While there is a cost to have journals and monographs bound, this is minimal compared to the cost of buying new materials.

Recently, an LBI task force lead by Laura Cameron of Stanford University Libraries and composed of Ian Bogus of Yale University, Joe Dunham of LBS, Eric Fairfield of The HF Group, David Martinelli of University of California Bindery, Molly McIhon of Archival Products/LBS, and Debbie Nolan, HBI/LBI Executive Director, created the Library Binding Toolkit. This toolkit is specifically designed for those who are involved with library binding, but may be new to the field, or do not possess an extensive background in binding. The guide is broken down into four sections which shed light on the library binding field, the processes involved, some of the binding options, and relevant background information.

Each section of the toolkit contains valuable information for anyone in the library binding industry, starting with the basics: “What is a Certified Library Binder” and “What is the Payoff of Library Binding?” These introductory articles lead into some of the main features of the toolkit, including in-depth articles such as the *Guide to the ANSI/NISO/LBI Library Binding Standard* (which has been generously lent to LBI for educational purposes), Superior Materials Used in Library Binding Make the Difference!, Why Books Fall Apart, and Music… A Binding Challenge. These articles are invaluable to someone new to library binding, or someone who is looking to gain further expertise in the area.

Lisa L. Fox and Carol E. Eyler were gracious enough to provide the Library Binding Toolkit with their annotated bibliography. This bibliography provides myriad examples of the best texts

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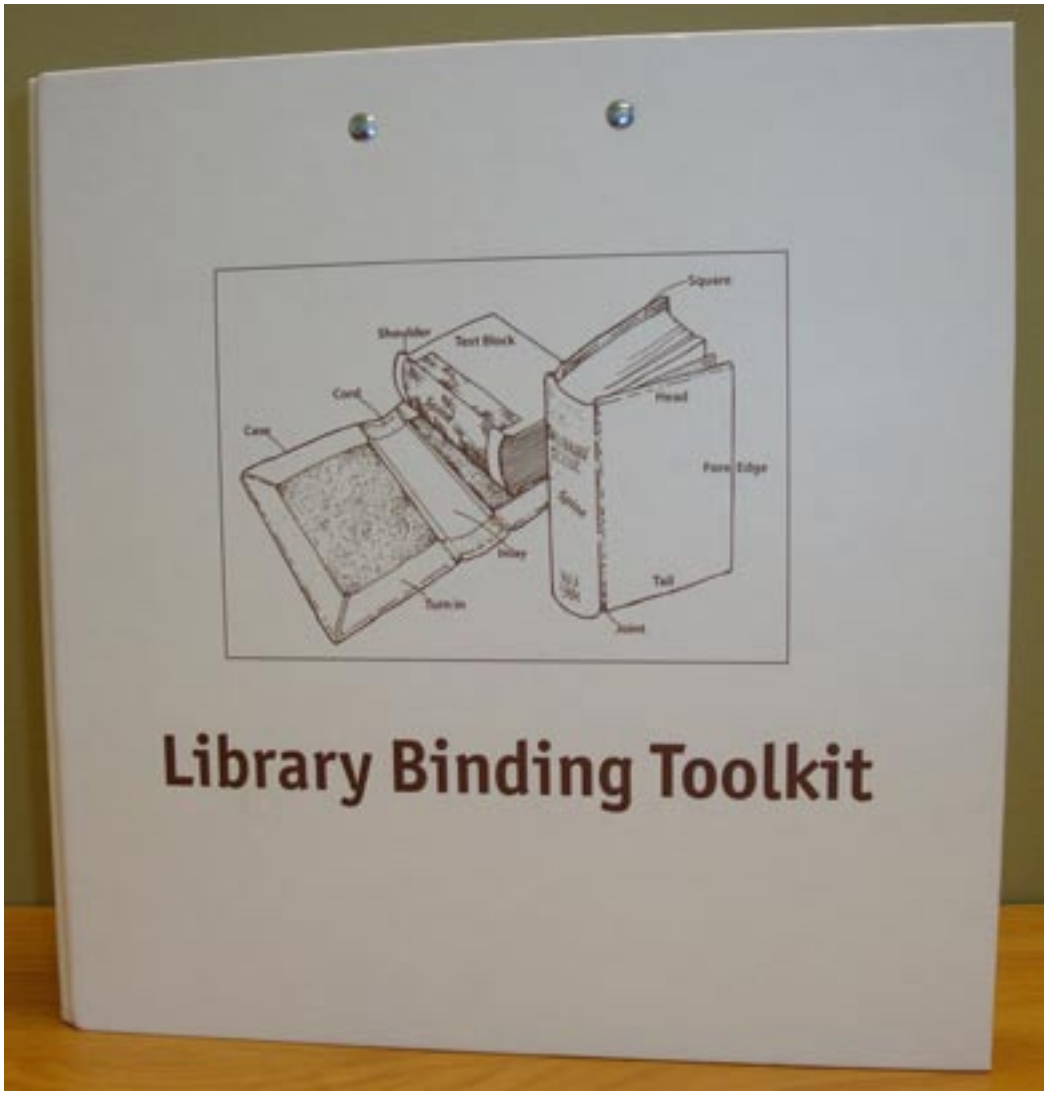
to examine regarding library binding, including multiple subjects like “Binding Program Management”, “Librarian/Binder Communications”, “Technical Issues” and much more.

The following section guides readers through various binding options and methods as well as standard binding policies, concluding with an extensive glossary containing every phrase a certified library binder could ever need. The guide comes to a close with twelve steps to improve a library binding program, as well as binding material samples.

The Library Binding Toolkit is available to LBI members for a nominal fee. Non-members will also be able purchase the toolkit. The articles held within the Library Binding Toolkit are valuable for those looking to increase their knowledge of library binding or those who have recently entered the field. As Laura Cameron put it, “The Library Binding Toolkit was created to serve as a handy resource for library staff. Contributions and suggestions are always welcome.”



Nature's Secret

The development of an additive for a new, strong and "green" Adhesive Binding

By Werner Rebsamen

Recently, our small community decided to "go green" and started a so-called stream recycling program. Some of the do's and don'ts caught my attention—such as the fact that we are not allowed to recycle glued magazines and catalogs. Since those have to do with binding, I became very interested. True, hotmelts used for binding various publications most likely are not recyclable. Our adhesive suppliers sell a hotmelt that is recyclable, but more costly—and, in our competitive world of business, not often used. The new PUR adhesives do wash out of the pulp, but how can a layperson tell the difference? In addition, hotmelts and PUR adhesives require a lot of energy, as they must be heated and applied hot. As environmentally concerned individuals, we must ask ourselves, are there better solutions? Sure we could use cold emulsion PVA adhesives, but then you can forget about high-speed production—that is adhesive binding up to 18,000 magazines or catalogs an hour. European book manufacturers use PVA adhesive extensively on books, which is why these bindings open relatively flat. Products using coated papers and bound with hotmelts must feature a rigid spine, a so-called clamping effect, to stay together. PUR adhesives improved the adhesion to such difficult to bind materials, but the lay-flat characteristics are often not what adhesive and machinery suppliers want us to believe.

Investigating Mother Nature for Superior Adhesion

If you search the Internet for new developments in adhesives, you do not have to look for long. For example, *Science Daily* (April 19, 2005) featured an article on "Nature Provides Inspiration for an Important New Adhesive." Oregon State University Professor, Kaichang Li, was harvesting mussels from their rocky home at the ocean's edge. He wondered how they could cling so tenaciously to rocks by their thread-like tentacles. As an expert in wood chemistry and adhesives, he decided to look more closely at the chemistry of the mussels' byssus, which are small threads that attach the mussel to rocks and other surfaces. To make a long story short, Professor Li published his findings and virtually changed the entire wood industry, eliminating to a great extent the dangerous formaldehyde-based adhesives. The "natural" adhesives, using the mussels' protein secret, are a chemical which they has also been found to be present in soy beans, of which the supply is plentiful. By adding amino acids to the soy bean protein, that combination worked like a mussel-protein adhesive. These adhesives are now increasingly being used for laminating things such as plywood, particle boards, veneers and more. Newer research is underway to create such protein adhesives from tree bark or wood decayed by brown rot fungus. It should be noted that these new developments represent a new generation of exceptionally strong adhesives. Now what about using a similar adhesive for binding books? The following is an all new development that is based on a similar theory but differs greatly from its application.

During the October 2009 Park City HBI/LBI seminar, we were privileged to learn more about a development of an adhesive system that could

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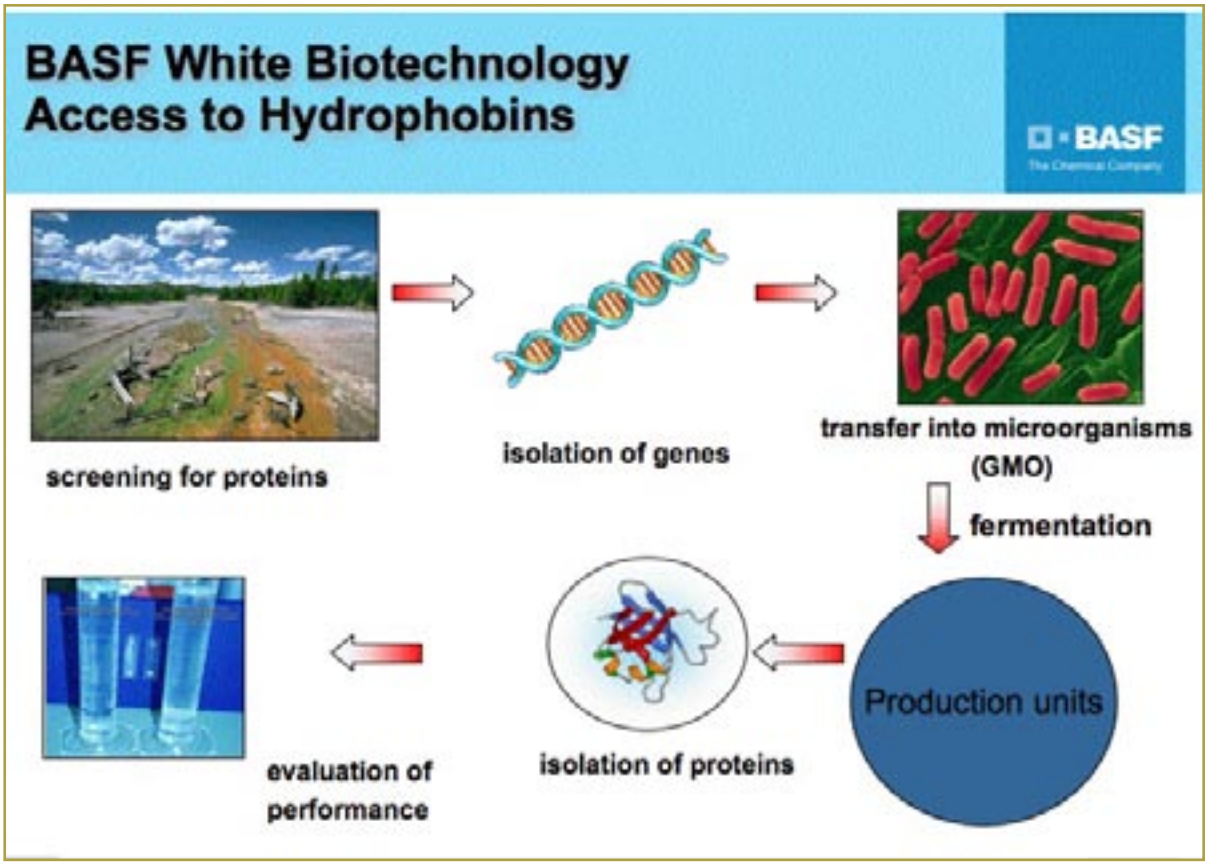
be used for adhesive binding. The system was developed cooperatively by chemical company, BASF, and machinery company, Ribler. The event was host to the world's first formal announcement of an all-new adhesive binding system, and we also had a chance to examine actual, bound samples. As bookbinding experts, we could not believe what we were privileged to evaluate. Lay-flat bindings, UV coated cardboards bound together with such strength—we were unable to pull out a sheet. The adhesive being clear and virtually invisible not only featured unusual flexibility, it did adhere to difficult-to-bind coated papers like a mussel adheres to a rock. This is indeed a new, revolutionary adhesive binding process.



Schematic of the new BASF additive to be used in adhesive binding.

Dr. Ulf Baus, from BASF SE in Ludwigshafen, Germany was scheduled to introduce a new development of BASF in the field of performance proteins with the title of "Hydrophobins from BASF – Proteins for Modification of Surface Energies." Unfortunately, Dr. Baus had to cancel his trip on a very short notice. Franz Landen, an inventor with multiple talents as mechanical engineer, chemist and as a part-time professor, is a partner in this new, patented development and presented Dr. Baus's PowerPoint with great interest from the audience. (You could hear a pin drop!) Here are some of the highlights:

BASF H*Proteins/Hydrophobins – from Fungal Origin

Hydrophobins were discovered in the 1990's in the Netherlands. They have been studied intensely as they exhibit interesting properties. These hydrophobins appear in the outer cells of fungi, especially in their spores, where they hydrophobise the surface, thus keeping raindrops or water from entering the fungi. Hydrophobins are not enzymes; they do not exhibit enzymatic functions. It seems that their task in nature is to modify the surfaces of fungi. Unfortunately, nature does not provide big amounts

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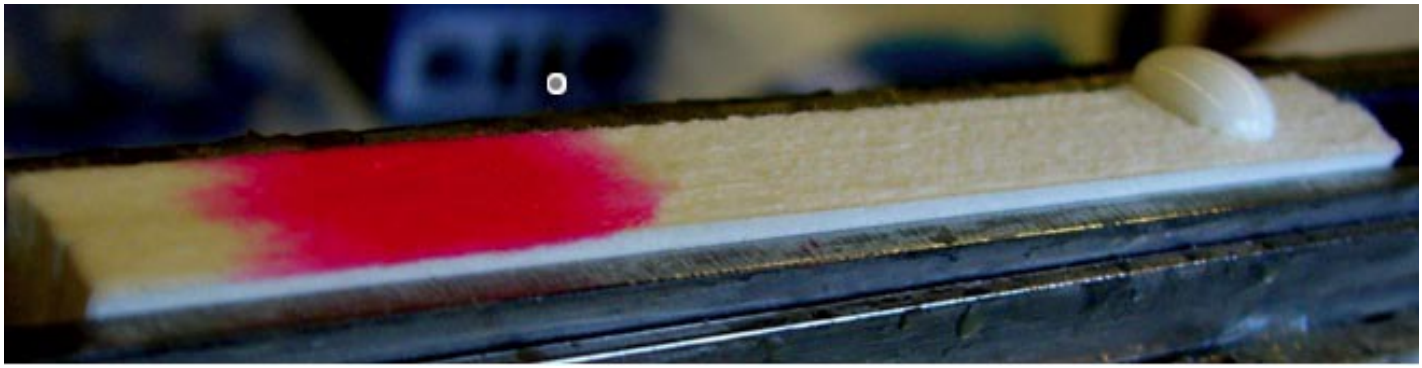

*Note, the PVA glue on the right just stays on top. The left side is treated with an H*Protein additive. The PVA adhesive, colored red is spreading, causing the unusual strong bond.*

of these interesting proteins. If, for example, you extract hydrophobins from 15 kg of mushrooms, you may end up only with just a few milligrams. BASF investigated the creation of hydrophobins by applying the so-called white biotechnology. This can be done by screening for proteins, isolating the genes and then transferring them into microorganisms (GMO). Fermentation results in production units and the isolation of the proteins and evaluation of performance follows.

BASF calls these hydrophobins H* Proteins, which gives customers a hint that these proteins are produced via white biotechnology. The interesting features of H* Proteins are their macroscopic behavior towards interfaces. They spontaneously adhere to all interfaces. By adhering to the interfaces, H* Proteins modify the surface energy involved and create a polarity reversal effect, meaning that now the surface energies appear to be reversed. Moreover, H* Proteins are chemically stable in a pH range from 4 to 10 and can be applied at temperatures ranging from room temperatures to as high as 150 degrees C.

Spontaneous Adhesion to Hard Surfaces

The hydrophobins powder is dissolved in water, a process which takes a few minutes and may be conducted at elevated temperatures. Once the solution is brought into contact with a hard surface, the molecules spontaneously adhere to the surface in a fraction of a second and generate a molecular monolayer of H* Proteins. The surprising effect is that the adhesion takes place only once, and it spreads evenly. No stack-up of molecules on top of each other can be detected. Another surprising feature is that this adhesion does take place independently from the nature of the surface. In other words, it really does not matter whether the hard surface is glass, polypropylene, or even Teflon. In all cases, a very thin layer of protein molecules is coating the surface. The coating is invisible and can only be visualized when the contact angles are compared.

The H* Proteins create a polarity reversal. Simply explained, the hydrophilic glass becomes hydrophobic, and hydrophopic Teflon becomes hydrophilic. Glass normally has a contact angle of 15 to 20 degrees. When coated with H* Proteins, the contact angle rises up to 60 degrees. Teflon has a contact angle around 120 degrees. When coated with the same H* Protein, the contact angle decreases down to 60 degrees.

The phenomenon of surface modification is still a matter of a BASF investigation. The scientists involved in this research simply do not understand the mechanism that does generate this effect.

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Here is a simple to explain example: You all know the effect when you try to paint on a silicon foil with a water-based paint. There is no wetting and the result is an uneven distribution of the paint. If the silicon foil is treated first with an H* Protein solution, the surface energy is modified, now allowing a water based paint to spread evenly over the silicon surface. After drying, a nice, even coating is achieved. This demonstrates the function of the H* Protein. In transferring the effect onto various cellulose materials, we are able to improve adhesion to it. Franz Landen, owner of the Ribler Company, and in close cooperation with BASF, generated the development of a new, revolutionary adhesive binding system. Summarizing the most important items without getting too technical:

- H*Proteins spontaneously adhere to all interfaces
- H*Proteins modify the surface energies
- H*Proteins are highly efficient – 1 mg covers more than a square yard of hard surface
- H*Proteins are eco/toxicologically unproblematic

Werner Rebsamen (center) with Franz Landen and Susanne Boemanns during a visit to the Ribler headquarter in Stuttgart, Germany. Note the panoramic lay-flat characteristics of the UV coated sheets. An impossible task of adhesive binding is becoming a reality.

You Need to See it to Believe it!

Last year, I was privileged to make the very first announcement of such a new and exiting development that may revolutionize the adhesive binding industry. Well, maybe not just adhesive binding. That H*Protein polarity reversal means we now are able to glue covering materials to virtually anything! But let us "stick" with adhesive binding.

Franz Landen developed a new adhesive binding system that includes the application of an H*Protein solution. I had to see that in operation, and in October 2009, I took a personal

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trip to Stuttgart Germany. Franz Landen and his charming assistant, Frau Susanne Boemanns, were kind enough to introduce me to various gadgets and machinery. As this is an all-new development, Ribler first concentrated onto a low-cost table top lay-flat adhesive binding system. The spine preparation is a separate unit which has several advantages, especially when hardcover binding. This is the most unique spine preparation I have ever seen, patents pending. It frees up the paper fibers like no other system for maximum glue penetration. Remember the thread-like tentacles mussels have to adhere to the rocks? Under the microscope, Ribler's "tentacles" look virtually the same. On the spine preparation unit, several thinner book blocks can be milled at once. The folded endpapers are then added. The table-top binding machine called Ribler Junior 420E/A is a semi-automated cold glue binder designed for on-demand and photo-book production. The book block is inserted into a clamp and the motion is activated. The first application is done with the H*Protein solution, followed immediately by the application of a specially formulated cold emulsion PVA adhesive. The glue gun is another Ribler design, patents applied. There is no cleaning-up required, no glue pots to clean, no PVA adhesives prematurely drying or changing viscosity due to evaporation.

After adhesive application, the book block moves to the cover station where it either receives a cover or a back-lining material (hardcover). Needless to say, at approximately two books per minute, this is a somewhat slow operation. But then, where can you get such a high quality adhesive binding for so little money? Franz Landen promised to have an all new Express Binder ready to

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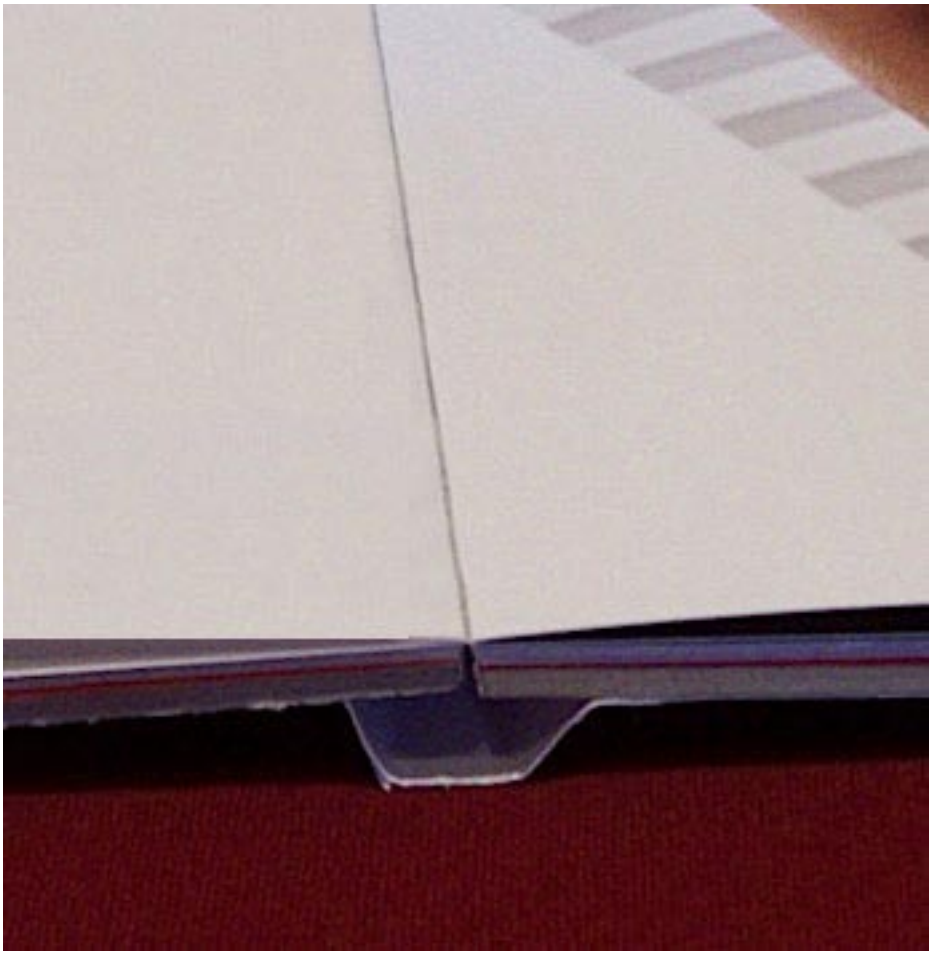

As shown during the Park City conference, the authors RepKover binding (patent expired) using the all-new BASF/Ribler technologies. Note the superior lay-flat characteristics. Participants were unable to pull out sheets!

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be introduced early 2010. Best of all, by using Riblers "green" technology, such bindings are 100 percent eco friendly.

The quality of the bindings using this new H*Protein solution are unbelievably strong. I examined various bindings, some done with UV coated, slippery papers, some with coated, heavy card-board like sheets. On none of the perfectly lay-flat binding could I remove a sheet pulling it straight out. (You may manage peeling them out.) As seen in Germany and at the HBI/LBI meeting in Park City, the lay-flat features and the unusual strength of the adhesive bindings are the best this writer and bookbinding expert has ever seen. That system, no doubt, will revolutionize the photo-book industry. How much more do you want from an adhesive bound book? Ribler's bindings are exceptionally strong and result in hands-off lay-flat books with a virtually invisible line in the bind-fold. Just imagine panoramic picture books with images going across the binding edge. Sure, the industry has other, much more expensive systems which fold and glue 4-page sheets together. But with Ribler's method, you are able to print a sheet on both sides; and best of all, you get the same panoramic effect with half the paper and a lot less labor!

Are There Commercial Applications on the Horizon?

These days, everybody wants to support "green" technologies. The majority of all adhesive bindings are done with hotmelts which, as stated earlier, cannot be placed into a recycling bin. Now the big question is, could this new BASF/Ribler development enhance dedicated efforts and support our "green" endeavors? After all, cold emulsion glues require no heat and most of them do not contaminate the paper waste. The answer is yes. It is just a matter of reengineering some components on commercial adhesive binding machines. The H*Protein can be applied similar to a primer. Then there is the question about speed. Tack is the word for how fast the adhesive is capable of picking-up a cover. Remember our first efforts with PUR? We had to run slow, because PUR's were slow in regard to tack and curing. Now we are able to run these adhesives at speeds of up to 18,000 an hour! Our bookbinding adhesive chemists, when challenged, can solve all of these problems. Therefore, it is likely just a matter of time until our large printing and binding facilities proudly announce to the world that they now produce all "green" adhesive bindings. Books, magazines, manuals and catalogs bound using this all-new technology lay perfectly flat and, best of all, are exceptionally strong.

For further information contact new HBI/LBI member Ribler Americas, www.RiblerAmericas.com.

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