

# *Quality Materials: Handmade Paper.*

## *Taking a Closer Look*

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This AIC presentation is about QUALITY MATERIALS, the Endpaper Project and the "Iowa Meeting". None of which could have taken place of course without papermakers, but most importantly, we would like to recognize the cooperation and support provided by the Library of Congress which made these projects possible. Also essential to the success of this venture was the continued support of Tom Albro, Head of the Rare Book Section. This collaborative effort by Barbara Meierhusby, Jesse Munn, Mary Wootton and myself, Terry Wallis, has been ongoing since the spring of 1991. The Library of Congress' Rare Book conservation lab interns (in particular Maria Calvagetti and Ralph Webber) as well as staff have logged numerous hours, many working with Jesse on paper testing. We sincerely thank all who have contributed to this effort.

As conservators, we are all concerned with quality of the materials that we work with. We want to insure that those materials are physically stable and will stand the test of time. But our standards of quality involve more than permanence. We are also concerned that both the working characteristics and aesthetic qualities of our materials are appropriate to the object. This talk is about the physical and aesthetic properties of 15th to 18th century papers, and the difficulty in meeting those quality criteria with 20th century handmade papers.

Events like the Florence flood have shaped the field of conservation over the last three decades. Conservators learned that the most important reason objects survived centuries of use as well as the flood was the high quality of the structure and materials from which they were made. In the last 30 years a range of new products have allowed us to improve the quality of our work. The Library of Congress has supported the search for quality materials for use in library and archival conservation. We have concentrated on the need for materials appropriate for conservation treatment, including vellum, alum-tawed skins, and papercase papers. Our recent attention has been focused on handmade endsheets papers where we have encouraged papermakers in the development of quality handmade papers by providing research and resources.

Several years ago our stock of handmade papers had diminished to the point where we began looking for a source of endpapers that met the needs of our collec-

tions. We could not find them. It seemed apparent that many conservators and suppliers too were looking for better handmade papers. My colleagues Barbara Meierhusby, Jesse Munn, Mary Wootton and I began investigating endpapers more systematically. Out of our common effort grew the Library's Endpaper Project and, in association with many more people, the Iowa endpaper meeting was organized. I will report briefly on the project and the meeting, but the main focus of my talk and, indeed of the project, has been quality: what it means and how we define it.

We know that the choice of quality materials and structures plays a significant role in determining what survives for future generations. As a result we use the highest quality and most appropriate materials in our treatments. Conservators are responsible, however, not only for the physical stabilization of collection materials but for their visual integrity as well. Indeed, the value of our collections is often based on its appearance, as much as on its content.

In other words, there is a quality of permanence and there is a quality of style. In our collections, we find many examples of 15th to 18th century papers whose permanence and durability is obvious: these papers have stood the test of time. They remain white, lustrous, and supple yet strong. They are a pleasure to touch and a delight to the eye. (In fact, scientists, conservators and papermakers have attempted to determine what enabled these early papers to succeed in order to incorporate those physical properties into the development of specifications and manufacture of modern papers.)

Whether a paper is appropriate for a specific conservation treatment depends on its permanence and durability, along with its working characteristics, and aesthetic properties.

As conservators, we recognize the value of understanding and developing a set of standard measures for evaluating papers' physical properties, these include fold endurance, tear resistance, and alkaline reserve; all properties which contribute to a paper's longevity.

Another significant factor is the working characteristics of the component materials. Are they appropriate for the job? Is the new material's strength, weight, and flexibility compatible with the artifact, thereby avoiding damage due to materials that function differently. In the 20th

century we have the advantage of hindsight; we see what materials and structures have survived as well as those that have not. The combined effects of poorly suited materials, structures and techniques is evident in many of the books bound and repaired in the 19th and 20th centuries. In many cases the repair materials have either broken down or caused adjacent materials to fail, hence, we are faced with the need to repair them again. This repetition of effort takes a toll on both collection materials and finite conservation resources.

But the physical and working properties of paper are only two parts of the equation that define the qualities we need. The third factor in our selection criteria is aesthetic compatibility. Essential aspects of conservation treatment are maintaining historic integrity as well as the aesthetic and visual qualities of the artifact. For example, this collection of Hebraic manuscript materials had been bound by a previous owner into oversewn structures. Evidence of their original papercase structure was impressed on the first and last leaves. The conservation treatment was then designed to incorporate those original elements. The resulting papercase structures were physically and visually appropriate to the object, and were sympathetic with the objects historical format and cultural context.

There are, then, three basic quality criteria: physical properties, working characteristics, and aesthetic qualities.

Ideally, once our criteria has been determined we conservators, should be able to ask a papermaker to produce paper that fits our specifications. Modern technology has developed techniques for making machine made papers that meet our standards of permanence and durability. Unfortunately, these machine made papers typically fail to meet our criteria for aesthetic characteristics and working properties. Conservators therefore rely on handmade papers to provide compatible new materials for use in conserving our collections. The hand papermaker can control the fiber selection, beating, preparation, the choice of mould, sheet formation, drying and finishing processes. As a result, one would expect that the papermaker would be able to produce a handmade paper with aesthetic and working properties compatible with the early papers in our collections. There are, however, difficulties communicating exactly what these desirable qualities are. There is also the complication of using 20th century equipment and technology to produce a 16th century style paper. One source of the problem is how 19th century innovations in machine made paper create different aesthetics, so it is there we must start.

In the 19th century it became possible to make papers with the use of chemicals and equipment which eliminated the process of stamping the pulp. Most modern machine papers are made primarily from processed wood

pulp, which produces a short, uniform fiber length. Machine made papers are formed on a rapidly moving wire mesh, that aligns the fibers in a strong grain direction. When held up to light, the paper has a regular distribution of pulp and few variations in fiber length, when compared to the natural variation obvious in a sheet of handmade paper. This regularity in sheet formation significantly affects the working properties and aesthetic qualities of the paper.

To improve their aesthetic qualities machine made papers are sometimes embossed with a surface pattern, using a Dandy roll, to suggest the "texture" of a handmade paper. The texture is pressed into the paper, and the papers are often dried under pressure. The result is a compacted paper too stiff to emulate important working properties like the drape and flow of handmade paper. So, when you use a machine made paper adjacent to the open less dense structure of a loft dried hand made paper stress is created, subsequently causing damage.

In general, these processing factors contribute to making machine-made paper physically and aesthetically incompatible for use with rare and special collection materials.

But 19th century mechanization had its effect on contemporary hand paper making as well. A smooth, evenly formed sheet, free from imperfections has been the goal of papermakers for decades. Today's hand papermakers have incorporated many of the innovations of the last 150 years. They carefully comb their pulp to remove all fiber clumps that might create imperfections in the surface of their paper. Recent developments in the drying process utilize machine-made industry techniques by drying the handmade paper with heat under pressure. An even, well formed sheet is what artists and printers want, and they are consumers of much of today's handmade papers.

It is not surprising, therefore, that handmade paper can be too hard and dense for use with rare and special collection materials. Some handmade papers are no more appropriate for use with early materials than machine mades. Many of the best modern papers, the ones made with the highest standards of craftsmanship and that meet the highest physical standards of quality are, in many ways, among the least appropriate for our work. That is the paradox of quality: when a conservator asks for a quality paper they want a paper with the aesthetic and working characteristics that the papermakers have been trying not to produce for the last 150 years.

Although this seems obvious now, we didn't comprehend the extent of the problem when we began our search for endpapers.

The LC Endpaper Project gave us an opportunity to work with papermakers in improving both the aesthetic and archival quality of endpapers. We knew that our choice of materials should not be limited by what was

currently available. Our experience indicated it was partially a question of demand and the existing level of expectation. We would have to identify and define those handmade paper qualities we felt were necessary for use in library and archive conservation. And finally, we had participated in the recent attempt by our local book conservation supplier who contributed support, in large part funding, to the production of a new handmade paper, these actions reinforced what we all knew, that achieving our goal of a new endpaper would be a challenge.

As I have already mentioned, we began by examining a number of 15th to 18th century books to determine the kind of paper we needed. Next we contacted bookbinders, conservators and suppliers in order to identify our mutual needs and interests as well as get input about the most commonly used papers.

None of the available papers met all of our criteria, which includes minimum performance requirements of permanence and durability; appropriate working characteristics and aesthetic compatibility; and affordability and availability. We also found in our discussions with colleagues that many were dissatisfied with the current paper supply, and almost everyone expressed frustration in their inability to affect the economic factors which determined their paper selection. At the same time, few conservators were in a position to contribute to improving the situation.

Our next step was to approach the papermakers directly with what, we hoped, was an adequate specification for an appropriate and compatible endpaper. Initial discussions confirmed that some papermakers were unaware of the reasons for dissatisfaction with their papers. They clearly felt that they were striving to provide what the conservators needed. By this point, it was apparent that many papermakers and conservators don't see the same thing when they look at a sheet of paper. We see different paper qualities by virtue of our different experience.

We had already found enough difference between modern handmade paper and the early papers in our collection to recognize that a new paper would have to be designed. Looking closely at both modern and early handmade papers gave us the opportunity to see how striking the physical differences were. Some modern handmade sheets which seem appropriate in thickness can be too hard and stiff. They lack complex surface textures and look-through. This makes the sheet appear flat, dense and lifeless. The color is often predominately *one hue and/or too bright*.

How color and texture are perceived is due in part to the way the sheet catches and reflects light. Pulp composition also plays an important role. For example, in early paper the combination of colors in the pulp optically blend to read as one. Because many of today's papermak-

ers often use dyes or pigments to obtain their colors, rather than depending on combinations of different white colored fibers, some modern paper is more likely to have a flat and uniform look.

These qualities are a direct result of the manufacturing process. In an early paper, the processing steps controlled the inherent factors which resulted in a sheet that was tough and strong, yet relatively thin, supple and opaque. Well worn linen and cotton rags are no longer commonly available, the labor and time intensive processes are impractical and have been altered for speed and efficiency. Beaters are used rather than stampers and, often, industrially processed fibers are often used as well as speed drying practices. These kinds of changes in materials and processes of papermaking make it difficult to duplicate early papers.

Our goal was not to reproduce these papers exactly, but to give the papermakers enough guidelines to produce a useable modern conservation substitute. We understood that what we were looking for would be difficult to achieve. We were also aware that this paper order would be as much a learning process for the papermakers as it would be for us.

We selected an internationally representative group of six papermakers who had shown an interest in developing conservation quality papers. The number of papermakers was determined by our budget and the financial logistics of "the custom order". We ordered 100 sheets from each papermaker, and asked them to keep detailed production records.

Our specifications addressed two major areas: physical and aesthetic characteristics. The physical specifications were written to insure that this paper would not deteriorate while at the same time we did not dictate fiber type and preparation so as not to interfere with the methods of the individual papermakers.

Settling on aesthetic criteria was more difficult, since there was such a wide range of early papers. In our original sampling of rare books, the early Italian papers stood out as a group which embodied the combination of characteristics we found so appealing. These papers were tough and yet supple, and had a lustrous quality common in early papers, but missing in modern papers. When held up to the light the look-through of these papers showed the variation of fiber size and distribution, characterized by knots and slubs and a heavy accumulation of fibers near the chain lines. The papers visual surface texture (the look-down) was patterned not only with the *depth of the chain and laid lines but also had a rich texture* resulting from the felts of the drying process. The sheets were thin, yet reasonably opaque, and had a varied tactile surface from clumps, knots and other fibrous components which lent character without being obstructive.

We had great difficulty capturing the paper characteristics we wanted in our specification criteria. In the end, we simply sent each papermaker an actual example. The project purchased a 16th Century Venetian book, "Spirituali," whose paper beautifully combined the characteristics, except for color, that we were seeking. In the order, the papermakers received a folio from the volume, a color sample, and a written specification. They were asked to duplicate the general characteristics of the "Spirituali" sample.

The physical criteria were established, with the support of the Library's Research and Testing Office and TAPPI standardized tests. The testing procedures and results have been detailed in the soon to be published project paper. This paper will specifically address the folding endurance tests.

To establish the folding endurance specification we ran some informal tests on currently available handmade papers. Past and contemporary Library of Congress paper research has found that cotton papers made with varying percentages of bast or abaca fibers increased the fold endurance by 6 to 30 times that of paper made with 100% cotton pulp. We set the fold endurance requirement at 150, informed the papermakers of the effects of the longer bast fibers and left fiber selection up to them.

All but one of the six papers we received met our standards. The papers retained 80% of their initial fold endurance strength after 14 days of oven aging, and they maintained at least 50% after 28 days. Therefore, these papers are appropriate for conservation use from a permanence/durability standpoint.

The Endpaper Project produced six very different papers. That in itself was informative, given that each papermaker began with identical specifications and samples. The papers showed a range of textures, most of which were very different from the sample. Unfortunately, many of the papers still exhibited the flat regularity of the 19th century aesthetic. They also varied considerably in tone and color.

Our purpose was not to make comparative evaluations between the project papers, but to utilize the knowledge gained from each of the papermaker's individual experiences. Some papermakers created papers that succeeded in physical tests and others that succeeded aesthetically, if possible, how could their techniques be integrated? These are questions that define the challenges facing today's papermaker.

In hindsight, it seemed clear that we hadn't gotten the kind of paper we expected from our specifications for a combination of reasons. To begin, some papermakers lack first hand experience with early papers, not surprisingly many don't view paper from the conservators perspective, and some may be working from a set of mental models more appropriate for 19th century papers. The

experience of the Endpaper Project reinforced everyone's belief that papermakers and conservators lacked a common vision and language.

We felt that these obstacles could be addressed by bringing a group of papermakers and conservators together. By closely examining a selection of historical papers — by touching, feeling, and seeing them — the papermakers could experience the kind of papers we wanted. We could learn from their expertise more about the limitations of producing an early style paper in the 20th century. And by talking about the papers together in a structured way we could begin to develop a vocabulary.

During the course of the Endpaper Project, we conversed with Dieu Donne about their parallel effort, the Conservation Paper Project. Combining our resources might allow us to bring a group of specialists together. The result of our combined effort was the Endpaper Project Meeting at the University of Iowa last November, 1992. The meeting was organized by us with Mina Takahashi of Dieu Donne and Tim Barrett from the University of Iowa. The participants included nineteen book and paper conservators, papermakers, and experts in related fields. The funding for the meeting was provided by the Kress Foundation, Library of Congress, Dieu Donne Papermill, the University of Iowa Center for the Book, and Bookmakers, Inc.

For conservators it was an opportunity to better understand the complexity of composing a specific paper. For some papermakers, it was their first opportunity to see early papers from the conservators perspective. The papermakers came away with a much better understanding of needs of conservators. By discussing and examining paper, we moved towards developing the common language necessary for describing the qualities of historic paper. Both the conservators and papermakers came away with a better understanding of how the different components of paper interacted. The idea that a quality paper made from a pulp not carefully combed appeared to be conflicting goals, but were really issues about process. For example, when conservators asked for paper with more "surface texture" the papermakers now understood that to mean a paper whose texture came from fiber irregularity, different moulds, different drying techniques and not the result of a deeper impression from the pressing boards.

In the most effective session, the participants chose project papers they would use with a group of books dating from the 16th to 19th centuries. The two papers that had texture matched the early books while the rest of the project papers beautifully matched the 19th century books. The exercise, in particular, impressed on the papermakers the significance of surface texture and irregularities.

The accomplishments of the meeting put everyone in high spirits and anxious to make paper. Committees, made up of the meeting participants, were formed to complete the work that had begun. A Terminology, Paper Specification, and a Report on the Iowa Meeting are, as of September 1993, in the final stages of preparation. Simultaneously, the four of us at the Library of Congress are in the process of finishing an indepth paper on the Endpaper Project. Although the results of the meeting are difficult to summarize, three conclusions seemed clear:

First, that papermakers are interested in producing papers that meet conservators needs.

Second, Conservators must know and be able to describe the characteristics they want in papers.

Third, together conservators and papermakers can increase the chances of rediscovering lost methods of making early papers within the framework of a 20th century craft. Factors which come into play are: fiber selection and preparation, the type of moulds used, different drying and finishing techniques.

Time is short, and I would like to use my last few minutes to return to the issue of quality materials.

We hope that no one will be disappointed that we are not closing with a list of six endpapers for use with 16th century books. If you are disappointed, we have failed to make our main point:

*Quality in conservation materials is not just a matter of permanence and durability. It is also a matter of appropriate standards of workability and aesthetics.*

Thousands of different papers were used historically, we cannot hope to produce a perfect substitute for each of them. But it is critically important to keep in mind that the closer we come to matching the aesthetic and working characteristics of the original paper, the more successful we will be in our efforts as conservators.

Don't feel badly if you can't find an appropriate paper for your collection's 15th century masterpiece, we couldn't either. But don't assume that asking your papermaker or supplier to give you the "highest quality" paper available will necessarily result in the best material for your book. 20th century standards of paper quality are exemplary, but they are not the same. The best modern paper is generally more dense and has a quite different surface texture. It won't look right and it won't feel right.

Do not despair, there is hope. An important outcome of the Endpaper Project and Iowa Meeting was to make papermakers aware that conservators have different needs in paper than artists and printers. But a more important lesson that we have learned, and hope you now know, is that there is a way to ask papermakers to make us the paper we need. It requires more than just being specific about the characteristics of the paper itself. Papermakers

need to know specifically what you mean when you ask for more surface texture or more "irregularity." We are still learning how to see the differences and together we are discovering how to make the paper we need. You can hasten the day when acceptable, appropriate, high quality papers are available by understanding your needs and articulating them. Only then will we get the paper we require.

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