POLYESTER ENCAPSULATION IN SIGNATURES

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The Conservation Office of the Library of Congress recently completed treatment and rehousing of the Library's collection of original Brahms manuscripts. This represented a collection of forty manuscripts averaging thirty to forty leaves each. Because of the good physical appearance of the manuscripts and the presence of highly soluble inks and pencil markings, it was decided that only limited treatment of the manuscript leaves was desirable. One of the more unusual problems was the removal of overlays (often on music manuscripts the composer pastes over a section of a score with a new piece of paper rather than scratching out or erasing). These overlays were lifted for the first time since their original composition by Ted Stanley, paper conservator in the Conservation Office, who was responsible for the paper conservation of the project.

Owing to the importance of the manuscripts and their frequent reader use, it was furthermore decided that polyester film encapsulation would provide the most effective protection. Previously, polyester film encapsulation in book format was specifically designed for brittle paper in single leaves. Many of the Brahms manuscripts, however, were in signatures with spine folds intact. Using an ultrasonic welder, a method was developed to produce book signatures of polyester film hinged with polyester nonwoven web. Dorothy Teringo and William O'Toole, conservator aids in the Conservation Office, helped develop this design and effected the large-scale assembly of polyester signatures, one for each signature of the original Brahms manuscript. The manuscript signatures were then sealed inside their companion polyester film signature. This design produces a structure that contains the original manuscript while permitting it to float freely within.

It was also possible by this method to seal the removed overlays within extra sheets of polyester added to the appropriate signature. One can see the overlays in their proper position, or, by turning the leaf, reveal the original underneath.

The steps in constructing the polyester signatures are illustrated in the accompanying diagrams. The first seal (Figure 1) welds a strip of polyester web (Remay) approximately 1 1/2 inches wide to a sheet of polyester film (Mylar) approximately 2 inches larger than the signature to be encapsulated in the head-to-tail dimension and 1 inch larger from spine to fore edge. The horn of the ultrasonic welder should be adjusted tightly enough to make the weld but not so tight that it scores and thereby weakens the polyester web. The trimming of the sealed film and web should be as close to the line of the seal as possible without cutting into it. After the first seal is trimmed, the polyester web is folded back over the seal and tested at this point for a strong weld. The second sheet of polyester film is then sealed to the web, as shown in Figure 1, and trimmed as before. At this point one has a folio of polyester that can be used to encapsulate a single folio of paper. The paper object faces the side of the polyester folio with the polyester web hinge. A folio of polyester film with a web hinge folds more easily and lies flatter than folded polyester film.

The best solution we have found for the encapsulation of multiple folio signatures is the construction of four polyester film sheets to a single polyester web hinge. This construction was developed by O'Toole and Teringo as a means of handling single section items of up to seventeen folios. But the design works as well for "thin" double folio sections and would work for signatures of over seventeen folios. The key problem that this construction solves is that of buildup of material at the spine. A simple piling of polyester and paper would require the outer folios of a signature to fold unnaturally over the buildup of materials of the interior folios. The polyester web hinge of this construction takes care of the problem by throwing each successive interior folio slightly forward toward the fore edge. As a result each folio of text folds comfortably over only the two sheets of film and web hinge that encapsulate the folio on the inside.

To make this construction, the first two seals (Figure 2) are the same as those for the simple polyester folio. After the second seal is made, however, the web is folded back when trimming so that only the film is trimmed. The third seal is the trickiest, since the polyester film must be rolled so that the third sheet of polyester film is sealed on the correct side (this is indicated by the curl on Figure 2, Seal III). Again, after the third seal, the film is trimmed without trimming the polyester

web. The fourth seal is identical to the second seal and, following this seal, the film and web are trimmed together.

The final diagram (Figure 2) shows the side on which the folios of the text are placed. Notice in this diagram that either folio 1 or folio 2 could be the inner folio. A double folio signature would be finished by adding a single polyester folio to the inside, as well as two sheets of polyester film on either side of the outside of the signature. These outer sheets would be sealed together without polyester web at the spine, allowing extra film to extend beyond the spine seal for binding. At this point the encapsulated signature would be finished by sealing in each folio at the head, tail, and fore edge and, finally, by trimming.

In practice, the polyester signatures were made separately from the signature of the book to be encapsulated. The necessary combination of hinged polyester folios and double folios was collected and carefully aligned along the spine fold. This package was then held in place with small strips of double-sided tape put between the sheets of polyester wherever a page of text would be. The tape was put at the fore edge far enough away from the spine so that it would later be trimmed away with the excess film when the signature was completed. With the polyester signature held together in this way -- the object was still not inside -- all the seals along what was to be the head edge of the book were made. Note that because the horn of the ultrasonic welder will not travel over the spine area of folded polyester web, the welder's horn must be brought by hand as close to the spine fold as possible and the weld made in one direction out from the spine. Care needs to be taken also to ensure that the seals are perpendicular to the spine and that they are aligned when the signature is closed. This was accomplished by using a right angle on the bed of the ultrasonic welder and a back gauge at the tail of the signature.

After all the head seals were made, the next step was to begin placing the object signature in the polyester, and then securing it firmly in place with seals made along the tail edge. The proper sequence is important for this step, to avoid damaging the object: Only one folio at a time is put into the signature and then sealed in, beginning always at the center of the section and working out. The single seal at the spine, followed by the fore edge seals, are the final ones to be made using the encapsulated pages as a guide. The sealed signature is trimmed as the last step before binding.

FIGURE 1. CROSS-SECTION of a REMAY HINGE

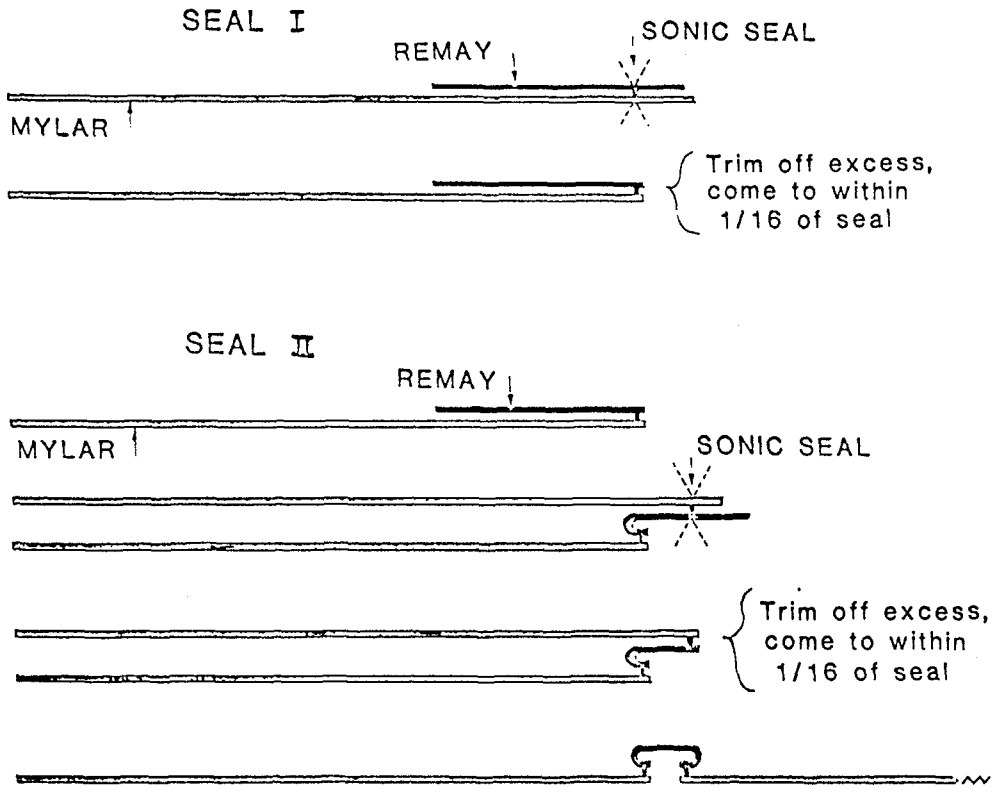

FIGURE 2. REMAY HINGE of FOUR MYLAR SHEETS