

# PUTTING SHOES ON DUKE HUMFREY

## A Passive Conservation Measure in the Bodleian Library, Oxford

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### Abstract

For a group of folio volumes in Duke Humfrey's Library, the oldest reading room of the Bodleian Library, Oxford, a suitable method of protection had to be found. Various storage options were examined and for the majority of the volumes the book shoe was chosen as the most appropriate enclosure.

This article outlines the design and basic functions of the book shoe as well as its limitations. Aspects like handling, reshelving and problems associated with openly displayed material are discussed. Finally the making process is described in detail.

### Introduction

Duke Humfrey's Library is the oldest part of the Bodleian Library - the library of the University of Oxford. In the mid-fifteenth century Duke Humfrey of Gloucester, youngest brother of King Henry V, gave several hundred manuscripts to the University, and a magnificent reading room was built to house them. Originally Duke Humfrey's Library was furnished with lectern-desks, with the bindings chained to the desks and stored horizontally on shelves under the lecterns.

This arrangement lasted for only about sixty years. During the Reformation the manuscripts were scattered and the library stripped of its desks, while interest in a centrally funded University library decreased as the individual college libraries increased their holdings. At the end of the sixteenth century Sir Thomas Bodley, a retired diplomat, refounded the University Library by refurbishing Duke Humfrey's Library and stocking it with old and new books. Three-decker presses [1] were built, in which the books were stored on end, with their fore-edges facing out and secured by chains.

Within a decade acquisitions of books had grown to such a point that Bodley built an additional wing, called Arts End, to contain them. This is believed to have had the first 'book wall' [2] in England; in it, the larger and heavier volumes were kept on chains below a gallery, while the smaller, lightweight volumes were kept unchained, above the gallery (which was locked to all but the librarians).

Duke Humfrey's Library preserves this arrangement today, though the chains have been removed and most books have their spines facing out. Many of its original holdings are still in their 17th-century order. Duke Humfrey's Library serves as one of the principal reading rooms in the Bodleian Library and at the same time it functions as a showpiece for the Bodleian, where visitors enter on a regular basis. The conflict between the needs of a historic building and a library in use presents a particular challenge when it comes to conservation and preservation practice, and compromises have to be found to suit the requirements of each.

### The Duke Humfrey's Library Project

In the late 1980s the deteriorating state of the books shelved in Duke Humfrey's Library became a matter for concern. In 1988 a group of 1588 folio volumes from Arts End were surveyed [3] and funds were raised to set up a conservation programme to deal specifically with the holdings of this reading room [4]. The survey and subsequent practical conservation work provided an understanding of the nature of the physical breakdown typical for the binding structures of these folios.

The majority of the surveyed volumes were bound in full leather towards the turn of the seventeenth century, when Arts End was built (it was completed in 1612). A smaller amount of material consists of either stiff or limp vellum bindings and later 18th- and 19th-century additions bound mainly in leather, with a few in paper or mixed materials. Their average size, obtained from the survey, is 338mm in height by 230mm in width by 60mm in thickness. As a group they present a homogeneous collection with similar features and types of damage.

The reasons for their physical [5] deterioration can be narrowed down to three main causes:

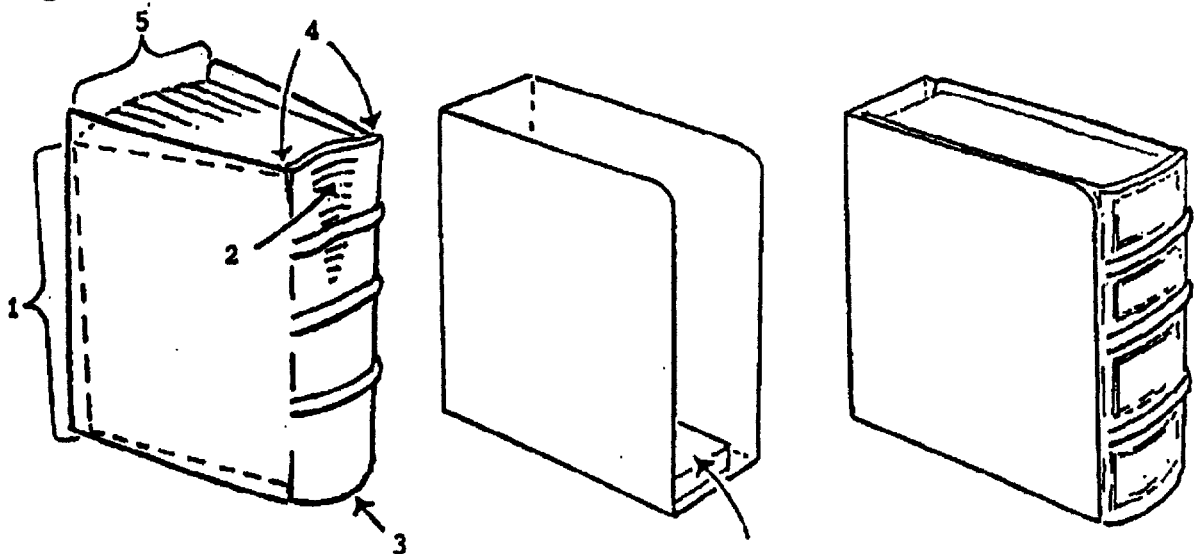
- a) standing the books on end, exacerbated by size and weight of the volume
- b) the type of binding structure and materials employed in the binding process
- c) the amount of handling a particular volume has received

The effects of shelving books on end can be observed quite clearly. Most of the folio volumes are flattened at the head of their spine and are over-rounded at the tail. They show the effects of text-block 'drag', from slight distortion to complete drop. A large number of folios have split joints, detaching or detached boards, or have already been rebacked. Some of the rebacked volumes have developed the same symptoms all over again.

Particularly heavy and/or wide volumes have dropped forward and sometimes sideways, and are being supported by their text-blocks. The tail-edges usually show signs of abrasion towards the fore-edge and centre of the text-block, from rubbing on the shelf. Some books have distorted even further, from having uneven board-squares, or through being shelved loosely, which causes them to lean more to one side than the other.

A small percentage of the volumes have their bindings still intact. These tend to be either of a lighter weight or have not suffered the same degree of handling. Some binding structures, e.g. German bindings of wooden boards covered in pigskin, or limp vellum bindings, are in better condition structurally than the majority of the English calf bindings. Various other structural factors which are commonly known have also contributed to boards becoming detached, i.e. the lack of sound endbands with laced-in cores, the quality of the leather used

Diagram no. 1



for covering, the use of tanned leather for sewing-supports, etc.

Because it was not clear how much the folios are currently being used, an arrangement was made with reading room staff to collect readers' request slips for all books in Duke Humfrey's Library. Since 1991 the slips have been added to the database of the survey, and a general pattern of reader usage has been observed. On average the folios are requested two to three times a year. It is, however, impossible to ascertain for how long and how much a particular volume is being handled each time it is requested.

### Analysing the Physical Breakdown

By analysing the symptoms described above, it is clear that vertical (as opposed to horizontal) book-storage leads to a continuous physical stress on the sewing structure and to the spine of a book, which largely contributes to its eventual structural breakdown.

The 'drag' on the text-block within the boards (1) pulls the head of the spine forward, resulting in flattening and widening of the spine or even a concave shape (2). At the same time pressure is exerted on the tail of the spine leading to an increase in rounding (3). This then causes the joints to break, usually starting from the head downwards (4). If the book is not restricted from opening (5), then the above stresses are exacerbated. The degree of damage is also dependent on the size and weight of a volume, as well as the type of binding structure. Tightly packed shelving can largely prevent this from happening, but it encourages damage to head-caps and excessive abrasion to the sides of boards, when books are extracted from the shelf.

### Requirements for Protective Storage in Arts End

Based on these observations and experience gathered during practical conservation work, a solution in the form of a preventative storage system for the folios became a prime concern.

### textblock support

The objectives for a suitable storage method were:

- a) to provide a means of text-block support for every volume which needed it
- b) to support neighbouring volumes on the shelf when one is removed
- c) to prevent dust from penetrating the text-block at the head-edge
- d) to minimize abrasion of edges, fragile board surfaces and tail caps
- e) to improve handling by staff and readers
- f) to isolate covering materials such as reversed calf, vellum and paper from smooth calf, to prevent the migration of leather dressing
- g) to prevent books with metal fastenings from scratching their neighbours
- h) to keep gaping books, and stiff-board vellum bindings, closed
- i) to find an enclosure flexible enough to accommodate wedge-shaped or other odd-shaped bindings
- j) to find a method which would be unobtrusive and architecturally acceptable for this reading room

### Methods of Protective Storage

A well-designed book-box can support a book structurally and protect it against light, dust and air pollutants to a high degree. It can also minimise damage due to incorrect handling in transit. But where books on shelves play a part in the appearance of a library or have to be on open access to readers, the extensive use of boxes, in all but special cases, is not acceptable.

The slipcase has been seen as one answer to this problem. While it protects all sides of the book except the spine, it can provide some of the functions of a box and at the same time be largely invisible on the shelf. Unfortunately slipcases do have a major disadvantage. Bindings with fragile or friable surfaces can be harmed by the abrasive action that takes place when the book is slid in and out.

The book shoe is a more recent, alternative design. It was developed in the early 1980s by Nicholas Pickwood

[6] in conjunction with Christopher Clarkson and Anthony Cains [7], with the intention of finding a method of protection for openly displayed material as is commonly found in National Trust libraries.

### **Design of Book Shoe and Basic Functions**

The book shoe is designed to prevent damage by covering the sides of the book and by keeping the fore-edge compressed while incorporating a support piece for the text-block (see diagram no.1). On being removed from a shelf the shoe rather than the book is handled. Because it is open at the head, the book shoe can be fanned out to enable the book to be taken out or inserted with minimum abrasion to the sides.

The first book shoes were made of cloth-covered mill-board. Coping with large amounts of open-shelf material, however, demanded a more economical manufacturing process. In National Trust libraries work is usually carried out on site, without access to a conservation workshop. Shoeing is often part of a first aid or "refurbishing" programme [8], in which large amounts of material are dealt with at speed. The manufacturing process therefore has to be simple and straightforward, as well as efficient.

In the early 1980s Christopher Clarkson produced an internal memorandum on the subject of book shoes, with a view towards their introduction throughout Duke Humfrey's Library. The books on a single shelf in Arts End were shoed to illustrate the idea to colleagues. However, the idea was not put into practice, because of concerns over its feasibility and a lack of resources.

Shoeing was again proposed following the survey begun in 1988. Together with other types of enclosure the book shoe was re-examined by the project conservators. Taking account of aspects such as the degree of deterioration of each volume, handling and aesthetic appearance, various fundamental questions had to be answered:

- 1) Do books with text-blocks which have dropped completely need a shoe? Should they be 'propped up' again; and is it possible to correct the distortion already taken place?
- 2) How would the shoe or enclosure be handled? Should it remain on the shelf or on the book, when it is removed from the shelf?
- 3) Should individual volumes only be shoed, or all of them? Is there space to accommodate the extra thickness added by the shoes? If not, how would colleagues react to the 17th-century shelving order being changed?
- 4) Which books are not suitable for shoeing, and what are the storage alternatives?

During practical shoemaking it became apparent that some volumes, if turned upside down, would readjust to some degree. Other volumes, depending on their binding structure and degree of deterioration, would stay permanently deformed. It was felt, however, that even without a text-block support a shoe would still fulfil most of the other objectives.

A small number of books were identified as not suitable for shoeing. These included limp paper bindings, pamphlets and books narrower than approximately 2cm in thickness. Samples of different types of wrappers were made to try to find an alternative solution. The use of phase-boxes [9], made of a less obtrusive, brown folding board, was envisaged. With the help of a librarian, a group of about 20 bindings - consisting of limp vellum bindings and important decorative bindings - were chosen for book-boxing. These, it was decided, would not disturb the overall appearance of the room.

### **Handling of Book Shoes**

The first book shoes made by the project conservators were shown to reading room staff and the functions of the shoe explained. The staff agreed that it was easier to remove a volume from the shelf if contained in a shoe. The question of whether shoes should then be returned empty to the shelf, or remain with the book, was also discussed. There was a fear that volumes carried around in their shoes might slip out if handled carelessly.

In libraries belonging to the National Trust, where it is more usual for particular books only to be shoed, the shoes remain on the shelf at all times. Librarians there are told to stand a book on its head so that the text-block can readjust before putting it back onto the shelf. The shoe is held upside down, fanned open and fitted onto the book. The book in its shoe is then carefully turned over and slid back onto the shelf. However, it was felt that this system of handling would be unsuitable in Arts End, where books are used far more frequently than in any National Trust library. The sloping desk surface in front of the Arts End shelves would make it difficult to stand books upside-down safely. Also, separated from its shoe, each volume would still be as vulnerable as before, during transit from shelf to reader. Lack of space at the issuing counter would also prevent shoes from being stored there while books were being read.

A decision was therefore made at curatorial level that in the Bodleian Library a shoe would be kept together with its book at all times. A further question was whether readers could be trusted to handle books in shoes correctly. It was suggested that some form of fastening across the spine should be investigated, and that an instructional label should be designed illustrating how to remove and insert the book into the shoe.

### **Reshelving**

It was estimated that, as a consequence of the decision to put shoes on all Arts End folios, an additional 6 to 8 shelves would be needed for the overflow caused by the thickness of the shoes. Additional space for this purpose was created by clearing shelves that had been used for 19th-century acquisitions [10].

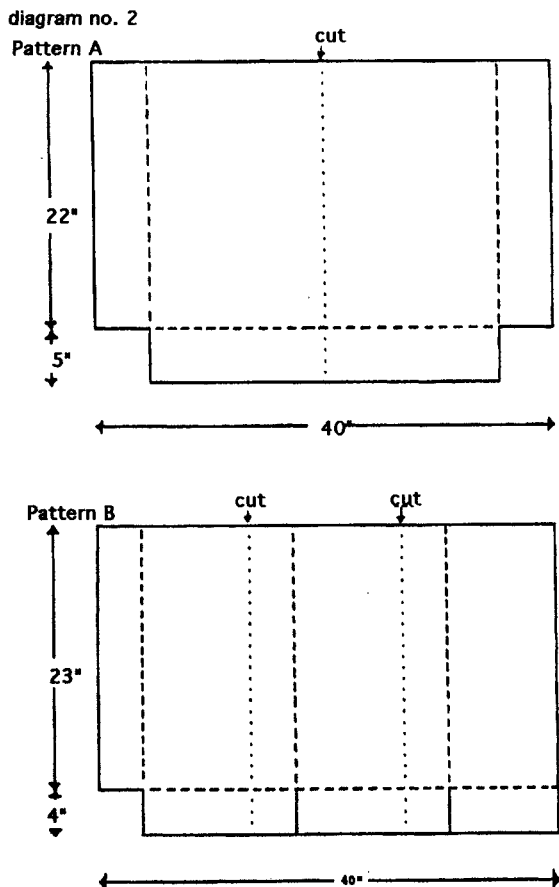
## Making the Shoes

### Estimating the Time Required

Trials revealed that making the shoes 'on' the book was easier, more efficient, and guaranteed a good fit. The alternative - to save carrying each book from Duke Humfrey to the workshop and back - would have been to measure all the relevant dimensions of each volume and to make the shoe 'off' the book. For carrying books and for increased efficiency it was thought best that two people should do the shoeing together. When the logistics were worked out, it was estimated that each bay of three shelves would take two people one week to shoe. This meant that all the folio volumes would take 6.5 to 7 months. As work proceeded, the process was improved as various colleagues added their ideas. Consequently the shoeing programme was carried out well within the estimated time-span. At the end it took about 30 minutes to make one shoe with fastener (not including the time needed for replacing books and pre-cutting the shoeing board).

### Shoeing Board

The shoeing board is acid-free millboard of 1mm thickness. The grain direction is parallel with the book's spine. The board is delivered flat to save transport costs and storage space. It can be purchased precreased to speed up the making process. There are four different creasing patterns which were designed for the National Trust, two of which were used for shoeing in Duke Humfrey's Library. The board patterns are as follows:



B2 (not illustrated) is the mirror image of B1. Both the B1 and the B2 pattern supply three halves of shoeing board each. This pattern was used for the majority of the volumes in Arts End. The A pattern supplies two halves needed for one shoe and was used for particularly large volumes.

### Velcro<sup>R</sup> Fastener

Velcro<sup>R</sup> fastener was chosen as the most suitable material for closing the shoes. Velcro consists of two nylon tape components, a hook side and a loop side, which adhere to each other on contact. If pressed together the two sides form a secure closure; for opening they are simply peeled apart. Velcro is used widely in the clothing industry among others, and will withstand exposure to water, solvents, heat, and general wear and tear. It has also been used in conservation, e.g. in phase-boxing.

Velcro tape of different widths and in standard- and self-adhesive quality was tried. For the final design tape of standard quality and 15mm width was chosen. The fastening is anchored on the side of the shoe that covers the lower book board, and closes on the upper-board side. The fixed ends are laced through the shoe for security and stuck down with PVA (on the outside of the shoe, so that the adhesive doesn't come in contact with the book). The tape across the spine of the book is the loop component of the tape with its soft side facing the book and its smooth side facing out. The hook component of the tape also faces out and is covered by the loop component when the fastening is closed.

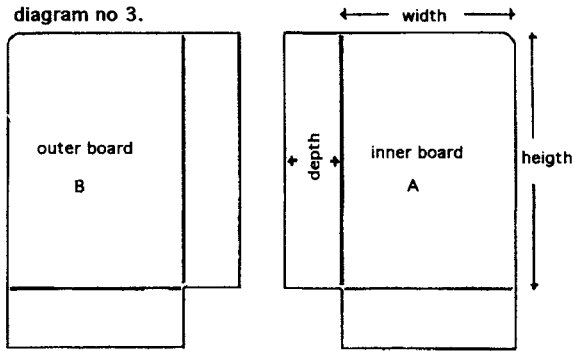
As most of the volumes concerned are wedge-shaped - that is, narrower at the spine than at the fore-edge - compensation for the thickness of the Velcro tapes is provided as the shoe moulds itself around the book when fastened. In a row of books, all of which have shoes, the height of the tapes across the spines must be staggered so that they don't rub against each other. They are usually placed within the third or fourth spine panel, roughly centred between head and tail. Books which have very smooth bindings without bands also are given a second tie across the head, to prevent their slipping out of the shoe at the head.

Tape in a variety of colours was tried on books shelved in Arts End, and three colours were chosen as standard - light brown, rusty brown and dark brown - to blend with the predominant tones of the book spines. To sum up, it was thought that this modern type of fastening would be understood by everyone, was easy to use, looked neat and was aesthetically acceptable on the shelf.

### Cutting and Assembly

The book shoe is made from two sides of board, an inner and an outer half (see diagram). Each half has two flaps, one along the height and one along the width of the board, which are folded over to enclose the fore-edge and tail-edge of the book, after they are cut to fit a particular volume. The two open corners are rounded.

diagram no. 3.

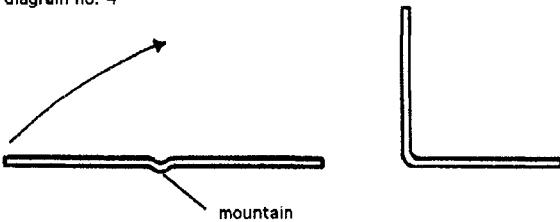


The inner side of the shoe, which covers the upper board of the book, fits into the outer side, which covers the lower board of the book. The sides are held together by glueing the fore-edge and tail-edge flaps where they overlap.

A stack of shoeing board is cut into segments ready for use. Two pieces of shoeing board, an inner (A) and outer (B) side are chosen for each volume according to its size.

1. The creases of the shoeing board are dampened with a moist sponge to ease the folding of the millboard. They are then folded at right angles so that the crease hook or 'mountain' is on the outside of the fold (see diagram).

diagram no. 4

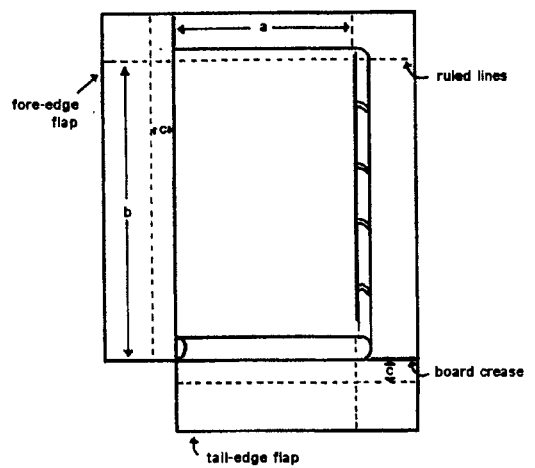


If folded the opposite way, some space inside the shoe is taken up by the crease mountains and the shoe will not fit so well. The tip of the board corner, in the angle where the two flaps meet, is cut out with a chisel to prevent the board from cracking at this point.

2. The book is placed with its upper board face down onto shoeing board A, with the fore-edge and tail-edge facing the flaps. The size of the book is marked on the shoeing board with a pencil:

- the width of the book at the head and tail joints
- the height of the book at the fore-edge and spine, less about 1mm so that the shoeing board won't protrude
- the thickness of the book along several points on the inside of the fore-edge and tail-edge flap, taking into account the thickest point of the binding and whether any pressure is needed on the book board

diagram no. 5



The marks are ruled off at the widest points. The line on the fore-edge flap has to be parallel to the crease along the height of the book. It also has to meet the line on the tail-edge flap, where they are folded in at the corner. The latter also applies when the book is wedge-shaped, even though the line on the tail-edge then is not parallel to the crease along the width of the book in that case.

The board is then cut along the ruled lines and subsequently checked on the book. If necessary, further adjustments are made on the board chopper. The centre of this board is marked to show that it goes inside the other board, to avoid a possible mix-up during glueing up.

3. The book is turned over, with its upper book board face up and covered by shoeing board A. It is then placed onto shoeing board B, which is marked at the corresponding points as board A. The flaps of board B should be slightly narrower than the flaps of board A.

The marks are ruled off and the board is cut. Both boards are checked on the book so that they are in line with each other.

4. The two open corners are rounded with a corner-cutter or chisel. Then the edges of the inner board, which are in contact with the book, are lightly sanded to take the sharpness off the board. The fore-edge flaps are then glued together, with board A facing up and placed under a weight.

5. The book is stood on its head to let the text-block readjust and to measure the space between the tail-edge of the text-block and the height of the board squares. A piece of board or card of a suitable thickness [11] is chosen and the dimensions are marked:

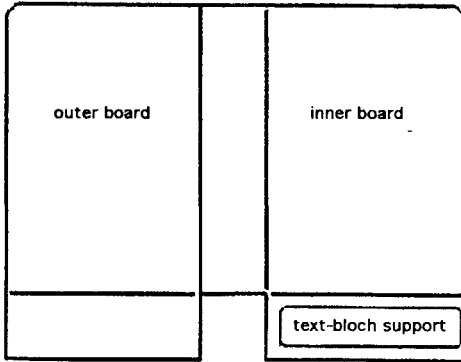
- the length from the inner joint to the centre of the fore-edge
- the thickness of the text-block, leaving about 2-3mm space between the sides of the text-block support and inner board edges.

The book is stood on the text-block support to test whether the appropriate thickness of support has been chosen. Sometimes the text-block edges buckle, and then a thinner support has to be chosen. If the text-block has dropped completely and irreversibly, no sup-

port can be used and instead the tail-edge flap is lined with Archive Text paper.

The support piece is rounded at the corners and lightly sanded along the edges. It is then glued into position on the tail-edge flap of board A and put under a weight.

diagram no. 6.



6. The shoeing board is rubber-stamped on board B to indicate the date of making and the maker's initials. The shelfmark of the book is written on the same side along the bottom edge.

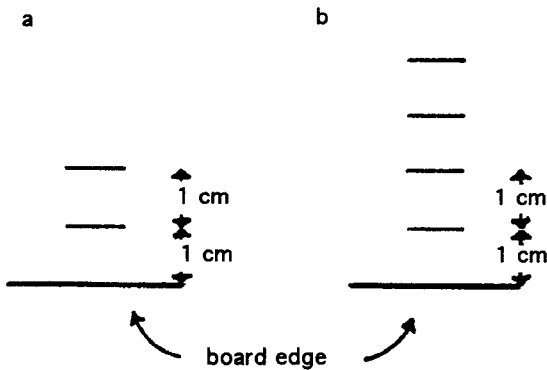
7. The tail-edge flaps are glued together and weighted from the inside of the shoe.

8. When a whole shelf of books has been shoed, they are stood up in sequence and the positions of the tapes are chosen and marked on both sides of the shoe.

9. The position of the slits for one tape attachment is marked with a template:

- a) two parallel slits about 1cm in from the fore-edge of the board and 1cm apart are needed on board B for the loop component of the Velcro
- b) four parallel slits about 1cm in from the fore-edge of the board and 1cm apart are needed on board A for the hook component of the Velcro

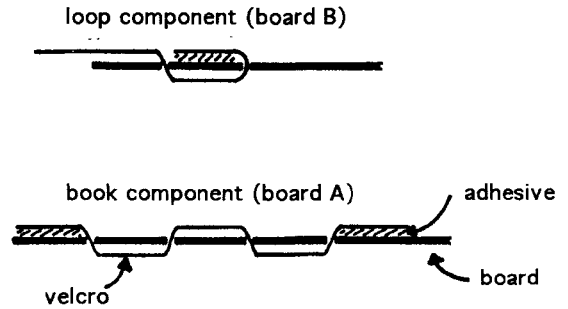
diagram no. 7



The slits are punched with a chisel. First the hook component is laced through the slits on board A, which can be eased by rounding off the tape corners previous to lacing. Then the loop component is laced through board B. The book is placed into the shoe; the loop component is fitted around the spine to judge its length and cut off between the third and fourth slit. The

Velcro is consolidated into the board with a hammer and then glued to the outside of the board with PVA and weighted down.

diagram no. 8



### Conclusion

The book shoe is a preservation measure designed to protect books stored vertically on open shelving, and is therefore a compromise. While it does not protect the spine and head of a book from light, dust and atmospheric pollutants, it does provide a means of support and physical protection which go some way towards prolonging a book's life. If used correctly the book shoe is a truly preventative form of conservation and less costly than any interventionist conservation treatment.

Given its simple and obvious design features, it is hoped that the book shoe will be understood and used correctly by readers. It is intended to continue monitoring the amount of reader usage of all books in Duke Humfrey's Library and to observe the possible effects of ageing and physical damage to book and shoe. This will also provide a valuable guide to storage systems being implemented in the rest of the reading room in the future.

### References

1. A three-decker press has three book shelves above a reading desk. See Burnett Hillman Streeter, The Chained Library, Macmillan and Co. Ltd, London, 1931, p.50
2. A library with all its bookcases backed against the wall. See Streeter, p.72ff. For more details on the history of the Bodleian Library consult Ian Philip, The Bodleian Library in the 17th and 18th Centuries, Oxford University Press, 1983
3. Bronwen Evans, "The Duke Humfrey's Library Project: Using an Item-by-Item Survey to Develop a Conservation Programme", The Paper Conservator, Vol.17, 1993, pp.39-44
4. The project is largely supported by the John S. Cohen Foundation and the Campaign for Oxford
5. As opposed to chemical factors, which contribute to the deterioration of materials depending on their chemical composition and environmental conditions.

6. Nicholas Pickwood was at that time advisor to the National Trust, an organisation responsible for the care and upkeep of historic buildings in Great Britain. The National Trust Manual of Housekeeping compiled by Hermione Sandwith and Sheila Stairton (The National Trust of Great Britain, 1991), contains a chapter on 'Books and Documents', pp.37-59, where the book shoe is mentioned.

7. Christopher Clarkson was at that time Conservation Officer at the Bodleian Library and Anthony Cains was and still is Director of the Library Conservation Workshop at Trinity College, Dublin.

8. Refurbishing commonly entails dusting, minor paper and binding repair and the consolidation and dressing of leather. A good description of a refurbishing programme is the publication Preserving our Printed Heritage - the Long Room Project at Trinity College, Dublin, by Anthony Cains and Katherine Swift, Trinity College, Dublin, 1988.

9. A phase-box is a four-flap folder made of archival board which is cut to fit an individual book's dimensions. It was introduced by Christopher Clarkson at the Library of Congress in the early 1970s as part of a phased preservation programme. See also Cains and Swift.

10. It was decided to push the sequence of folio volumes along within the folio shelves and to make new indicators showing where 'shelves' began. The overflow created at the end of the sequence is currently being put into shelves in Arts End which are adjacent to the folio shelves.

11. For making text-block supports we use offcuts of acid-free mounting board and card.

### Acknowledgements

I would like to thank Chris Clarkson for helping me to clarify my ideas and for letting me use his diagram of the book shoe (no.1). I would also like to thank Michael Turner, Head of Conservation at the Bodleian Library, my colleagues Bridget Mitchell and Dana Josephson for their assistance and all those who helped with the shoeing.

### Keywords

book shoe - text block drag - book-box - slipcase - phase box

### Suppliers

#### Shoeing board

Product name: Archivite; thickness 1mm, sheet size 864 x 1020mm; furnish: semi chemical 10-15%, unbleached Kraft 80-85%, traces of brown wood, bleached Kraft and straw; pH 6-8; moisture 5-7%, calcium carbonate buffer added; Thompsons Board Mills Ltd, Little Salkeld, Penrith, Cumbria CA10 1NJ, Tel. (01768) 881471, Fax: (01768) 881748

#### Velcro<sup>®</sup>

Velcro<sup>®</sup> book and loop fastener, 100% nylon, standard quality tape, washable and dry-cleanable, melting temp. 204°C, humid ironing up to 163°C, most oils do not affect closure strength, retains 50% closure strength in water, 100% when dried, acids will cause deterioration of tape, vibration increases strength, cycle life 5000 opening and closing (minimum), supplied in 25m rolls in 22 colours; Selectus Ltd, Fastener Dept, Biddulph, Stoke-on-Trent ST8 7RH, Tel. (01782) 522316, Fax: (01782) 522574

#### PVA adhesives

For glueing the shoeing board: Reversible PVA M218 from J. Hewit and Sons Ltd, Unit 28, Park Royal Metro-Centre, Britannia Way, London NW10 7BK, Tel. (0181) 9655377

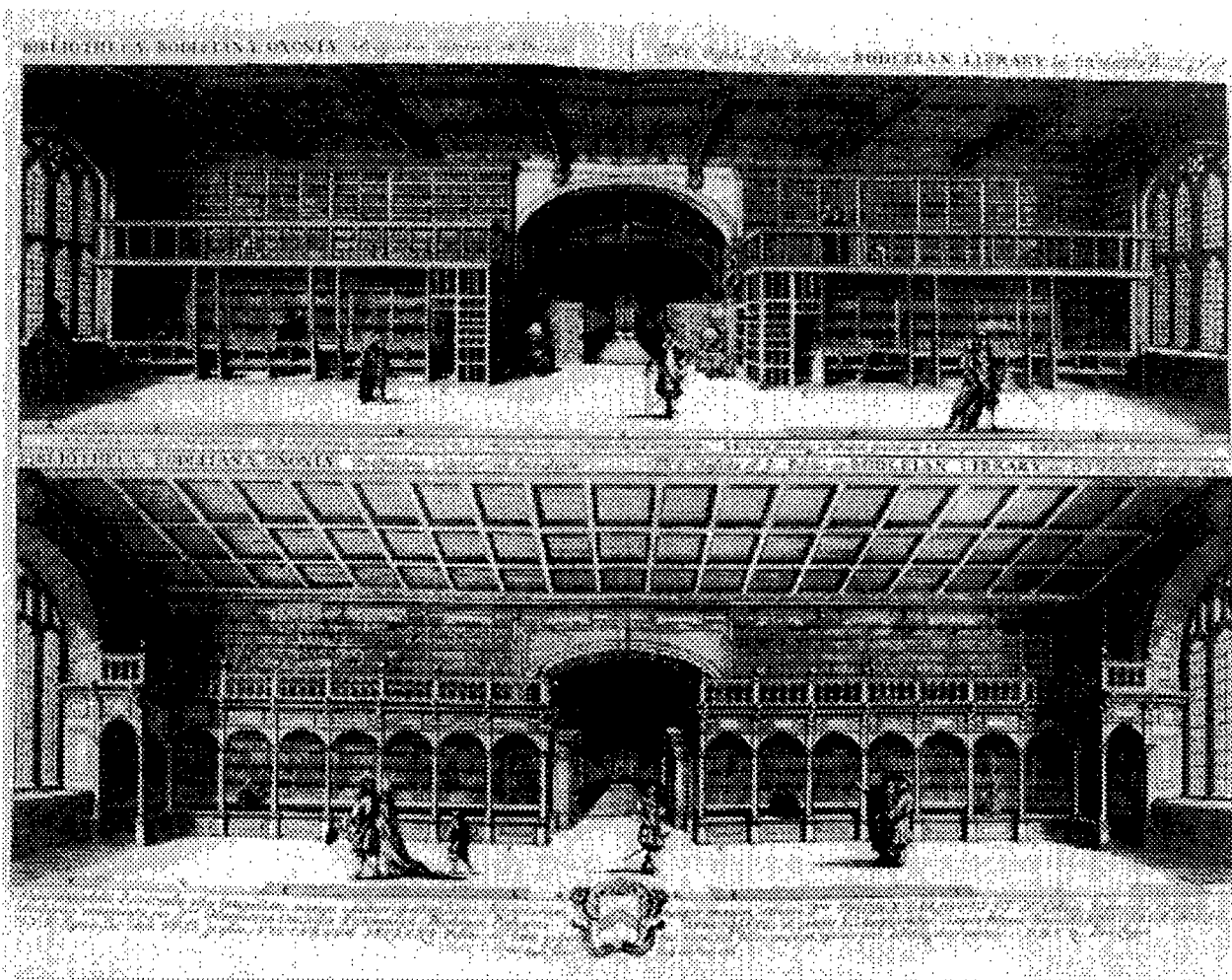
For glueing the Velcro tape to the board: SPLK-61 from Interlock Adhesives Ltd, Interlock House, Hospital Site, Hill End Road, Harefield, Middlesex, UB9 6JH, Tel. (01895) 825911/825912, Fax: (01895) 278941

#### Archive Text paper

Wood-free pulp, buffered with calcium carbonate to pH 9.4, neutral sizing. From R.K. Burt and Company Ltd, 57 Union Street, London, England SE1, Tel. (0171) 4076474



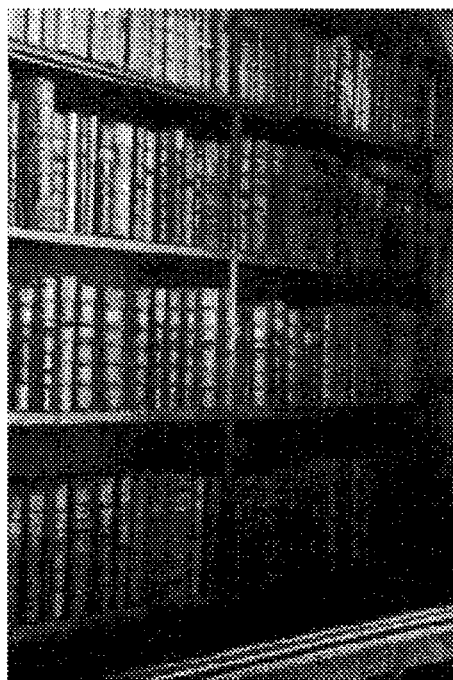
"Arts End today. Reproduced with permission of the Bodleian Library, Oxford"



"Duke Humfrey's Library, showing Arts End (top) and Selden End (below). From David Loggan's *Oxonia Illustrata* (1675). Bodleian Library, Arch. Antiq A II 13"



"Arts End folio with book shoe"



"Arts End shelves after shoeing. The three lower shelves were shoed. The top shelf contains 19th-century material which is not part of the survey and has subsequently been reshelfed elsewhere."