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Macro and microenvironments at the British Library

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Abstract

This paper describes the storage of the 12 million items which have just moved into the new British Library building. The specifications for the storage and environmental conditions for different types of library and archive material are explained. The varying environmental parameters for storage areas and public areas, including reading rooms and exhibition galleries, are described. An early assessment of the physical conditions in the new library building is made, reviewing the achieveability of the specifications in practice, together with an appraisal of the overall effect of the improvements to the macroenvironment on the collections.

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Paper

1. Macroenvironment

1.1 British Library Building at St Pancras

The new building for the British Library became fully functioning in the summer of 1999, when the last of the collections moved to the St Pancras site. The final stage comprised 200,000 monographs, 25,000 serial titles and 30 million patents of the Science Reference and Information Service (SRIS). Previously the Oriental and India Office Collections (OIOC), the Humanities, Philatelic, Music, Maps and Manuscripts collections moved from various locations around London into the new building over a two-year period. There has been a phased opening of the eleven reading rooms.

The controversial building designed by Sir Colin St John Wilson has opened to great acclaim, particularly for the light airy feel of the entrance hall and other public areas and for the use of natural materials such as brick, leather and travertine marble.

The building lies between Euston, St Pancras and Kings Cross railway stations and is in an area of North London due for regeneration. It is situated on a very busy, dirty six-lane main road. The building is approached across a wide piazza, under which are sited the main collection storage areas comprising four layers of basement.

The basements house 12 million volumes (approximately 6 million volumes remain off-site) in a variety of different types of storage depending on the different physical media and levels of security. The majority of printed books are shelved on mobile shelving (240 km out of 340 km of all the shelving is mobile) made of galvanised, polyester powder-coated, mild steel. Other physical formats, such as microfilm, sound recordings, maps, seals, scrolls, papyri, works of art and photographs have specific storage furniture, again made of inert material.

Whilst the majority of the collection at St Pancras is stored in the basements, material is also stored in the glass-fronted King's Tower housing King George III's library, and in other high security areas above ground including the exhibition galleries. In addition, reference material is on open access in the reading rooms. The amount on open access varies depending on the type of collection, for example, nearly 50% of SRIS material is on open access compared to 5% in Humanities. The collections are brought up from the basements and elsewhere to the reader by means of a Mechanical Book Handling System (MBHS) and the items are located and tracked by an Automated Book Request System (ABRS).

Throughout the building there is a fire alarm and detection system (FADS) with 4000 smoke detectors. The sprinkler system is a 'wet' pipe system. Inergen is used as a fire suppressant in the strong rooms and plant room. There is closed-circuit television and alarmed doors throughout the building. For emergency preparedness, in the basements there are freezers and vacuum packing machines, as well as salvage trolleys and salvage materials throughout the building.

1.2 Environmental parameters

One of the main reasons for building a new library was to improve the storage conditions of the collections. The majority had previously been housed in the British Museum which did not have air conditioning.

Particulate filtration levels are specified at 5 micron in the new building and atmospheric pollutant levels are monitored. A computer-controlled system maintains different lighting régimes within the building. Natural lighting is used extensively in the reading rooms augmented by artificial light. UV is excluded whenever possible. The specification for light levels in the reading rooms is 350 lux; in the storage areas is 50 lux. In the exhibition galleries fibre optic lighting of <50 lux or <200 lux is maintained, depending on the light sensitivity of the artefact on display. The galleries opened in April 1998 and the light levels are being monitored in the galleries as part of the rotation of objects. The environmental specifications are as follows.

	Relative Humidity	Temperature
Collection storage areas (basements and strong rooms)	50% ± 5%	170C ± 10C
Public areas, including Reading Rooms	50% ± 5%	210C ± 10C
Exhibition Galleries	50% ± 5%	190C ± 10C
Photographic store	45% ± 2.5%	150C ± 10C

1.3 Early assessment of achieveability of specifications

The Conservation Department has instigated weekly environmental monitoring using dataloggers to verify the BEMS system and check non-monitored areas. There are inevitable teething problems with the environmental control of the building for a number of reasons, ranging from non-exhaustive testing before occupation, to local plant being too powerful, to naturally evolving changes in use of parts of the building as its 1200 occupants moved in.

A conservator is responsible for monitoring the environment on all the BL sites. A weekly report is compiled, detailing which areas are within specification or if not, if they are within specified outer bounds, or if they are outside even the outer bounds. The outer bounds are a pragmatic approach to the environment in that whilst the highest standards are aspired to, it is recognised that in a new building this is not necessarily achievable immediately at all times and therefore the amount by which the environment is outside its specification carries different degrees of risk. Currently, the environment is within the specification for 60% of the time, within the outer band for 39% and outside that for 1% of the time.

In the exhibition galleries the cases, made by Glasbau-Hahn, have individual air conditioning separate from the general environment in the exhibition area. There are 5-10 air changes an hour. The original specification was 170C ± 10C, 50% ± RH 5% inside the cases and 210C ± 10C, 55% ± 5% in the gallery for the comfort of the visitors. For a variety of reasons this proved very difficult to achieve, not least because when the books, manuscripts, and other artefacts were put into the empty cases the bulk of the organic material had a buffering effect, it is thought, leading to greater fluctuations in temperature and humidity. A compromise of 190C ± 10 C, 50% RH ± 5% RH is now in place both inside and outside the cases. There have not been any complaints from the public about the lower temperature. The cases are monitored by the BEMS system and double-checked with dataloggers. If the environment goes outside the outer bound, which is specified as < 40% or > 60% RH, < 160C or > 220 C the public vacate the areas while the problem is solved. The lighting in the exhibition area is being logged, using Lux bugs (Hanwell Instruments) to calculate the cumulative light exposure of artefacts to help decide when to rotate them.

1.4 Appraisal of overall effects to macroenvironment of collections

The new building has undoubtedly led to great improvements in the macroenvironment in which the British Library's collections are held. The need to measure the impact of that environmental improvement on the rate of deterioration will be a future challenge. For the BL's library and archival collections, the methodology using isoperms, or adaptation of the time weighted preservation index' used for photographs are possibilities.

2. Microenvironment

2.1 Enclosures - boxes

The British Library uses a variety of different types of microenvironments whether boxes, enclosures, folders or envelopes made from a variety of materials. For boxes it mainly uses drop-back boxes made of archival millboard covered with archival buckram (acrylic coated)

and lined with archival paper; 'phase' boxes made of archival manilla tied with a button and tie, and a conservation adaptation of the wraparound, folded case (based on chit-su and tao boxes), made of archival mountboard, covered with a cotton cloth, lined with archival paper and held with bone toggles. Flap-case folders and envelopes (both of archival manilla and inert polyester) are used; slip cases are not used.

There are many different considerations which dictate which type of enclosure is chosen, some economic, some practical, some aesthetic. The comparative costs of the three main types of box are shown in table 1. The different types of boxes give different degrees of protection to the items inside and will endure different amounts of handling. The drop-back box is the most robust. The 'phase' box, developed by Christopher Clarkson at the Bodleian Library at Oxford, is so-called because it is regarded as the first phase of a book's conservation treatment. In reality it is often the only treatment a book will receive. Phase boxes can be bought as ready-scored flat packs which can be made up by anyone, not necessarily a conservator. However they are not available in an infinite number of sizes and so the box may need to be packed out to accommodate the volume snugly. Phase boxes can be made by hand, using a hand- or hydraulic creaser to fit an individual item and take about 35 minutes to make. There are now computer-operated machines which make phase boxes and take about 6 minutes. For example, the National Library of Scotland and the British Library have a Kasemaka Box and envelope making machine (CXD KM503). The comparative costs for the different sorts of phase boxes are shown in table 2. These machines can potentially be programmed for cutting mounts and it may be possible to develop them for making cradles for book display.

A third type of box used at the British Library is a conservation adaptation of the wraparound, folded case, of the Japanese chit-su and Chinese tao boxes. This is used almost exclusively for stab-sewn, limp paper, often multi-volumed oriental bindings.

2.2 Boxing projects

At the British Library improvements to the microenvironment of individual items is often done on a project basis. In particular there were many boxing projects before the moves into the new building, not only to minimise risk of damage during transit, but to improve storage and handling once on the new site. For example, all the palm-leaf manuscripts which are particularly vulnerable were boxed prior to being moved.

Since moving to the new building the opportunity has been taken to examine work practices, organisation and treatment. So, for example, the six furbishers have become the Collection Care Section, dealing with a wide range of preventive conservation and maintenance including cleaning, immediate repairs and box making. They have just changed from making boxes by hand to operating the Kasemake machine. Given the scale of the conservation need at the British Library the work is carried out on a project basis. For example, a large collection of 10,000 unbound European manuscripts in the Oriental Collection are particularly vulnerable when being transported from the storage area to the reading rooms and their treatment was conceived as a project. Examination of the treatment options, ranging from microfilming to fasciculing to encapsulation to binding to boxing, determined that the latter was the best option both from curatorial and storage points of view.

2.4 Interaction of macro- and micro environment.

It is very simplistic to divide storage neatly into macroenvironment and microenvironment as the two are obviously interconnected. Sometimes the one will be used to combat problems with the other. In the new British Library building, the environmental specification of photographs in the Oriental Photographic Store was proving difficult to achieve (150C ±10C, 45% ± 2.5%RH,). Therefore as an interim measure dataloggers were placed inside the store, inside an empty box, and inside a drop-back box which already had photographs in it and the results were compared. The environment within the boxes was stable, compared to the cycling pattern outside. As an interim solution therefore, the photographs will be boxed to create

microenvironments until the macroenvironment of the store is solved.

3. Future developments

Macroenvironment and microenvironments are only part of the care of the collection. At the British Library all the elements which affect the storage are being formulated into 'Levels of Collection Care'. This is adapted from the UK's Museums and Galleries Commission Levels of Collection Care which define basic, good and best practice in terms of handling, etc. In that the British Library still has a number of stores both within London and in the North of England which are not to the highest standards of the new building, the aim is to ensure that everything is at least at a basic level of care.

In the area of microenvironment the British Library is looking into the use of an anoxic (oxygen-free) environment for storage of some parts of the collection. Work at the University of Cambridge suggests this is also useful for magnetic tape. Vacuum-packing of newspapers has already been used in libraries (such as the State Library of New South Wales) but anoxic storage would involve introducing oxygen scavengers and oxygen-level indicators. This is being investigated as part of a large project to preserve the newspaper collection, and might be used for storing newspapers in poor condition which have been microfilmed. The use of newly developed materials such as Microchamber paper and board, which absorb pollutant offgassing, is also being looked into as part of this project, as well as the use of acid scavengers. In addition, vacuum packing is being investigated as a technique for accelerated drying of water damaged items in the event of a flood.

Table 1 comparison of boxing costs

Box type	Price
Drop-back box	£50.00
'Chit-su'-type box	£50.00
Phase box - see table 2	£4.50-£12.77

Table 2 comparison of phase box costs

Phase box	Price
Inhouse - hand made	£11.45
Inhouse - boxing-making machine	£4.50
External	£12.77

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