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Conservation: Out in the Open
The Challenges of Displaying & Conserving Textiles on Open Display

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Contents

Foreword

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In 2004, the then Textile & Historic Interiors 'Sections' of UKIC held a joint Forum. Remarkably, given the mutual & many overlaps of interests, it has taken further seventeen years to hold another joint conference. The following papers were to be presented in person in March 2021 but, instead, like all such planned gatherings over 2020-21, were presented over four days on Zoom.

Despite Covid-19, many offers of papers were received, and the themes presented themselves – Work on Public View: Upholstery Conservation, Developing Practice: Furnishings & Wall Hangings, Collections on Display: Tapestries & Books , Visitor Spaces: Challenges of Objects on Open Display & Spring Forum Conclusions. I would like to thank all the speakers for agreeing to present online, venturing into new territory for us all.

The other innovation for 2021 was the decision to produce pre-prints instead of post-prints – a development we hope to continue. Many thanks are due to all concerned from both the committees of ICON Textiles and Historic Interiors Groups for their work with this publication. All had to grapple with working from home and without the usual resources to assist them. The following publication is a true team effort but special thanks must go to Viola Nicastro who worked tirelessly on its production until days before her maternity leave.

WORKING ON PUBLIC VIEW: UPHOLSTERY CONSERVATION

Session One

'Can I Sit in it?' The Public Conservation of Politicized Chairs

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Introduction

Western modes of conservation have undergone a crucial shift in the 21st century, expanding from a materials-based approach to one that strives to encompass the preservation of the intangible and social meanings contained within cultural heritage objects. An important part of this development has been the (self-)recognition by individual conservators of how their perspective is affected by their socio-political identity. This positionality – factors such as race, gender, education, age, language, nationality etc. – modulates their practice, research, and engagement with other professionals and the broader public. Acknowledgement of the conservator's subjectivity is significant as it refutes conservation's long-held claims of neutrality, opening up the potential for more dynamic spaces where non-conservators shape the care of cultural heritage objects.

Parallel to this shift in approach, more conservation projects are being undertaken in the public eye, facilitating active engagement between visitors, conservators and objects; and creating opportunities for the multiplicity of meanings embedded in objects to emerge. Given the social, cultural and historical significance of many cultural heritage objects encountered, some of these interactions may lead to conversations or self-reflexive thinking that are uncomfortable for conservators. This further highlights the non-neutrality of conservation, but also provides invaluable opportunities for conservators to examine the nuances of their own positionality, their bias, and thus professional limitations.

This paper centres on interactions between visitors to the National Science and Technology Museum (NSTM) and conservator Rosie Cook (Asia-Pacific Cultural Heritage Preservation and Restoration Start-Up Technology Research Center, Cheng Shiu University, hereafter CSUCC) during the treatment of two armchairs from the office of General Chiang Kai-shek, from the collection of the Republic of China Military Academy (ROCMA). This informal engagement forms a case-study in how an autoethnographic approach allows an individual conservator's awareness of their positionality to evolve through interactions with the broader public. It is supported by the relationships, decision-making processes and discussions between Cook, Wu Ching-tai (NSTM) and Li I-Cheng (CSUCC) that were necessary for the treatment and reflection process. It has been important to recognize their contributions in the shared authorship of this paper, by creating an opportunity for CSUCC textiles conservator Rosie Cook to work in the NSTM Open Storage, where visitors are able to interact with conservators. These visitor interactions, often beginning with discussions of the materiality or provenance of Chiang's chairs, frequently led to deeper questions about the decision to conserve the armchairs, given their origins and social significance.

With these factors in mind, this autoethnographic 'impact report' has evolved, allowing for positionality and subjectivity to be acknowledged. Autoethnography uses a systematic

analysis of personal experiences to challenge canonical approaches to research and the representation of others; it becomes both a process and a product, treating research as 'a political, socially-just and socially-conscious act' (Ellis *et al* 2011, 273). An autoethnographic assessment allows conservators to identify and document how their personal input and cognitive processes affect their work. By pursuing self-reflexivity, using the first-person narrative to anchor and highlight the decision-making process, the conservator is able to make dilemmas explicit, identify elements of discomfort and, most importantly, stay critical of their own intervention (Stigter 2016). Several sections are therefore written from the point of view of the primary author and conservator, Cook, whose role as a non-Taiwanese, Western-trained conservator was also of interest to visitors.

This paper will first provide the historical and social contexts for the armchairs and an overview of their treatment, before using an autoethnographic, first-person analysis of how the CSUCC and NSTM's shared ambition of raising awareness and appreciation for cultural heritage conservation led to mutually affecting, cyclical relationships between conservator, objects, context, visitors and stakeholders. This autoethnographic process of self-reflexivity, assessing the conservator's subjective interpretations of this treatment, reveals the fallacy of neutrality in conservation and museums.

Cultural and Historic Background

Some fluency in the complex history and politics of Taiwan is required to understand the ROCMA's collection of objects relating to General Chiang Kai-shek, as well as its conservation, interpretation and public reception. The island was first settled by Austronesian Taiwanese around 6000 years ago, and from the 17th century was colonized repeatedly by the Dutch, neighbouring Chinese provinces, the Japanese, the Kuomingtang (the Chinese Nationalist Party, hereafter KMT), and then heavily influenced by the US government before becoming a democracy in the 1980s.

The first President of the Republic of China (1950-1975) Chiang Chung-cheng is an influential figure in the establishment of a shared Taiwanese identity. Known as Chiang Kai-shek in Western contexts, he is considered second only to Mao Zedong as the most important individual in 20th century Chinese history (Tsang 2010). Contemporary public perceptions of Chiang range from national hero to ruthless dictator. Following his role in triggering civil war with the Communist Party of China, Chiang retreated to Taiwan. His long authoritarian rule over Taiwan is associated with the period known as the 'White Terror', which began with the '228 Incident'. On the 28th February ('2-28') 1947, up to 28,000 Taiwanese civilians were massacred for perceived opposition to the KMT government, and over the following 40 years, a further 140,000 Taiwanese were imprisoned (Hsueh 2017).

Another means to dismantle resistance against the KMT was the re-Sinicization of Taiwan to build a unified Chinese identity. This included the renaming of streets, fines for speaking Taiwanese or Japanese instead of Mandarin, and the building of the National Palace Museum (Kuo 2000). Inadvertently, this fostered the development of a distinct Taiwanese identity among a population previously subjected to Japanese colonisation for five decades (Wachman 1994). In 1986, one year before the lifting of martial law, the revered historian and activist Su Beng called for the people of Taiwan to 'disassemble the colonial, economic

and political structures they have suffered under for 400 years [in order to] develop new structures of their own devising, . . . thereby achieving an appropriately Taiwanese democracy' (Su 2017).

In the now highly democratic and independent Taiwan of the 21st century, this process of colonial disassembly is nonetheless still ongoing. The establishment of the Transitional Justice Commission in 2018 has resulted in the exoneration of many political convictions, as well as the removal of statues and memorials symbolic of the cult of personality surrounding Chiang during the authoritarian era. In October 2020, the Commission reported that whilst 70% of authoritarian symbols had been relocated, those under the responsibility of the Ministry of Defence were subject to appeals based on their historical value (Central News Agency 2020).

Conservation Assessment and Treatment

The two chairs in this project belong to the ROCMA museum, where a display of original furniture from Chiang's offices creates a scene for visitors to imagine the General at work. The furniture includes a desk and upholstered desk chair, as well as a set of four matching armchairs, manufactured between 1960 and 1970 (Figure 1-3). Three of the armchairs had been previously treated using upholstery restoration techniques; this project focused on the conservation of the desk chair and the fourth armchair. The wooden desk chair has wicker cushions in the back, seat, and armrests, upholstered with a brown and gold patterned silk and cotton twill. The armchair is made of wood, cushioned with metal springs and foam, and upholstered with a golden-brown, geometric patterned heavy silk and cotton twill damask.

The upholstery of the armchair was very degraded. Its stained and splitting covers revealed deteriorated foam padding beneath, the consistency of hard, crumbling gravel and dark orange in colour, consistent with the degradation of polyurethane foam (Rivers and Umney 2007). Greasy stains from use were present throughout, and the fabric on the armrests had become adhered to the acidic foam, which accelerated its own material degradation and fragility (Eastop and Gill 2001). The desk chair upholstery was in better condition, with damage contained to the armrests, where the silk wefts had worn away, the loose cotton warps were broken, revealing the wicker below.

Figure 1. Armchair before treatment ©NSTM 2019

Figure 2. Armchair cushion before treatment ©NSTM 2019

Figure 3. Desk chair before treatment ©NSTM 2019

The extensive damage contains valuable information; deformations and patterns of wear are evidence of many years of use, revealing the social biographies within each object (Cook *et al* 2020). The armchair was by far the most worn of the set, suggesting it was the default seat of its owner, perhaps due to its position in the office. Given its extremely degraded condition, it was decided to preserve the existing materials and this evidential usage. Ideally, treatment would address the significant degradation of the foam padding that was making the entire upholstery fragile and unstable. However, this would have been an expensive and highly interventive process, and the conservation budget for the chairs was limited. The agreed aim between ROCMA, NSTM and CSUCC conservators was therefore to 're-establish the original shape and profile of the chair whilst the original materials remain available for investigation' (Eastop and Gill 2001).

Treatment occurred primarily between September 2019 and March 2020, in the Open Storage, a large warehouse-type storage space in the basement of the NSTM. It houses objects of particular scientific or technological interest, the majority of which are large machinery on open display. Conservation activities are also carried out here periodically during museum opening hours. The objective of the Open Space exhibit is 'to improve public knowledge and understanding of artifact preservation and maintenance of objects' (NSTM 2019). Visitors can purchase entrance tickets or whet their curiosity with a glimpse through the glass doors. The conservation area is not visible from outside the doors but a TV screen at the entrance sometimes broadcasts conservation work live.

Visitors to the Open Storage were able to observe the conservator at work during this project (Figure 4-5). Treatment actions included surface cleaning using a museum vacuum,

soft brushes and polyurethane sponges. Stitched support secured the damaged upholstery fabric by sandwiching the original material between a cotton support fabric and a nylon net overlay, both commercially dyed in matching hues. As the seat cushion foam was completely degraded, it was removed, and a support cushion was made of carved polyethylene foam block padded with polyethylene foam and felt (Figure 6-7).

Figure 4 (left). CSUCC Textiles Conservator Rosie Cook with three members of an organised tour, explaining conservation work being carried out on Chiang Kai-shek's desk chair, in the Open Storage at National Science and Technology Museum, Kaohsiung ©Lee Yun-hsuan 2019

Figure 5 (right). Interns working on Chiang Kai-shek's armchair, in the Open Storage at National Science and Technology Museum, Kaohsiung ©Rosie Cook 2019

Figure 6. Armchair after treatment, complete with cushion ©NSTM 2020

Figure 7. Desk chair after treatment ©NSTM 2020

Autoethnographic Analysis

Given the limitations of positionality, autoethnography is a particularly suitable approach – it is not possible to measure the impact of the treatment upon visitors, however a record of the impact the visitors had upon the conservator and her interpretation of the treatment can provide some insights. The following section is therefore written in the first person, highlighting the subjective nature of her experience.

Limitations

The following analysis is shaped by:

- The very limited subset of the Taiwanese population who:
    - Engaged with me regarding the treatment of the armchairs,
    - During their visit to the Open Storage space [1],
    - While visiting the NSTM;

- The demographics of visitors to the Open Storage area were primarily:
    - School groups
    - Retiree tour groups
    - Individual visitors
    - Museum staff and volunteers

    - Formal guests of the museum, including attendees of a celebratory anniversary event;

- My positionality both in communicating with visitors and in undertaking the analysis, including the language barrier.

General Interactions

Whilst the work was carried out on open display, there were no didactic materials or information panels to provide context for visitors, so the only means to find out more was to speak to me. Questions and general level of interest varied according to the groups and individuals. Many of the visitors were initially drawn to my workstation out of curiosity in seeing a *waiguoren* ('foreigner', a term used to designate anyone who does not appear to be Taiwanese) in an unexpected context.

Formal visitors and museum staff had questions in line with my expectations based on previous experiences. Opening queries about what I was doing would be answered with a broad statement (e.g. 'supporting the original silk by stitching a support fabric') and refined with technical details if interested (e.g. 'using curved needles and fine polyester thread to secure a net overlay'). Questions about why we were not replacing the fabric provided the opportunity to explain concepts of significance, reversibility and minimal intervention. However, when engaging with the broader public, these typical questions and answers would sometimes lead to more complicated and uncomfortable questions, querying why these chairs were worthy of conservation, and why a *waiguoren* was carrying out this work.

Like many people working outside their native language, I rely strongly on non-verbal cues from interlocutors (Cook *et al* 2017). Somewhat bemused expressions indicated that visitors were often unclear why the dusty, worn upholstery would be significant but did not wish to be impolite by directly questioning the value of my task (although others would have no such qualms). Sensing this interest, I would bring up the chairs' provenance, talking about the ways in which 'an upholstered armchair used almost exclusively by one person soon takes on the shape, and pattern of wear and tear, characteristic of the sitter' (Eastop and Gill 2001). Visitors nodded, giving formulaic responses (e.g. 'Ah, these are the chairs of *Chiang Gong*') [2], but I began to notice a range of non-verbal reactions, following a pattern depending on their age and background.

Range of Responses

School groups, and others born well after the end of Chiang's rule, had moderate or even disinterested reactions, appropriate to hearing that a dusty chair belonged to an historical figure from their school books, and moved on quickly to the next exhibit. Adult patrons who would have been children in the 1970s or 1980s, had more solemn reactions, nodding gravely and agreeing that this did make the chairs more significant.

Older visitors who had lived under Chiang's rule as adults, and who would have experienced the period of the White Terror, had what I interpreted as more emotional, yet frequently guarded reactions. Some would take a step back, their faces closing off, preferring to end the conversation here. Others would lean in, their eyes widening, and ask further questions,

expressing deepened interest and sometimes excitement, perhaps even asking permission to take photos. One particularly lively retiree even asked if he could sit in Chiang's chair, and laughed good-humouredly when I explained that was not possible since it was a museum artifact.

Visitor questions often focussed on why I, a non-Taiwanese, was carrying out this treatment, and were justifiably driven in part by the rarity of 'foreigners' working outside of English-teaching roles in Taiwan. A simple response points to the lack of professional textile conservation training, and therefore textile conservators, in Taiwan. It is part of my role at CSUCC to provide training in textile conservation and indeed I was accompanied by Taiwanese interns for much of this project's duration. Visitors seemed to infer that I must be a costly foreign expert, challenging their ambivalence as to whether these objects were worthy recipients of my efforts.

These discussions are important in challenging the belief that work done by those of European ancestry holds greater prestige. However, despite my desire to portray myself as 'equal' to my Taiwanese colleagues in this regard I began to feel a little uncomfortable as I noticed the range of emotional reactions to the provenance of these otherwise primarily functional objects.

Interpretations of Neutrality

As opposed to the concept of neutrality and absolute scientific truths, a humanistic approach promotes human-to-human knowledge exchanges rather than a reliance on academic sources, engaging with the individuals whose experiences make them living documents of cultural heritage (Cook *et al* 2020). As a humanistic conservator, my assessment of what is or is not important in the treatment of an object is calibrated by my understanding of its different values, and I am therefore particularly vulnerable to misjudgement when working on objects from cultures other than my own.

This was in fact not my first encounter with Taiwanese expressions of discomfort relating to the conservation of Chiang Kai-shek's property. During a previous CSUCC-ROCMA project conserving uniforms belonging to Chiang, I took professional delight in the textile details. Meanwhile, my Taiwanese colleague, a 25-year-old conservation assistant-in-training, had been uncharacteristically silent, before asking me if I had ever had to conserve things that I didn't want to be conserved. My initial response was to explain the necessity of neutrality in our profession, and that whilst we are not always the ones who decide what to conserve, it is important that we do so without distinguishing between 'good' and 'bad'. Now, as I engaged with visitors at NSTM, I more fully realised my position on Chiang was not one of neutrality, or of 'moderate assessments' in line with official statements. In fact, I was ignorant of the true impact of the White Terror upon the Taiwanese population [3].

Neutrality in itself is not inherently wrong, but the professed neutrality of museums has been increasingly recognised as an oppressive feature of covert and sometimes internalised white supremacism. By the time I finished treating the ROCMA armchairs, I realised my outsider status was not necessarily an asset: the sense of 'neutrality' I felt was best explained as a lack of understanding of what Minister of Culture Cheng Li-chiun described as the 'deep scar hidden in the hearts of all Taiwanese' (China Post 2017) [4].

My experience of working in the Open Storage was a gateway towards a more nuanced understanding of the complex significance of Chiang in contemporary Taiwanese society, as well as of the impact of collective and intergenerational trauma. Whilst the White Terror officially ended with the lifting of martial law in 1987, it remained a taboo subject for those generations who experienced it; the 228 Incident was not acknowledged publicly by the Taiwanese government until 1995. Artist Chen Wu-jen speaks of how 'families of the victims could only swallow their pain in silence . . . Their genuine, heart-wrenching sorrow could only be expressed through silence at home' [5]. In a study of the 1976 Thai student massacres, Winichakul makes a relevant observation that silence does not mean the trauma is forgotten, rather it is 'a symptom of the inability to remember or forget' (Winichakul 2020).

Through observations and conversations with friends or colleagues, I learned that the taboo around the White Terror continued to affect the younger generations. Survivor Pan Sin-sing felt it was not safe for families of victims to speak of their experiences to their children in case they repeated what they had heard (Redon and Datiche 2017). The casual, dispassionate attitudes I observed in the school groups suggested how little they understand of this traumatic past, partly because of the older generations' inability to speak of their experiences – including linguistic limitations, due to the lack of a common language between the Mandarin-speaking youth and their elders who are more fluent in Taiwanese or even Japanese [6].

Education systems do not always fill this gap either, glossing over these uncomfortable events. My history teachers in France emphasized the patriotic nature of a 'rogue' Vichy Regime (1940-1944) and the glory of the *Résistance*, as opposed to the collaboration with Nazi Germany. It was only in 1995 that a French President publicly acknowledged the responsibility of the French State for the deportation and subsequent death of Jewish people during that time. Based on the findings of the Transitional Justice Commission, Taiwanese teachers who cover these topics 'have been suppressed by school administrators, received complaints from parents or been ostracized by their colleagues' (Chen 2020). This effort to unite Taiwanese by forgiving past oppressors is noticeably lacking in open discussions on a more personal scale, ignoring individual experiences of trauma.

Memory and Memorialisation

In an article about visitors to a memorial garden filled with relocated Chiang statues, retiree Ting Lai-pin is described as 'fondly recalling' the era he associates with building Taiwan's economy and strengthening its armed forces against 'Communist attack' (Taipei Times 2007), suggesting a dissociation from the human costs. The location of the 228 Incident, now renamed the 228 Peace Memorial Park, including a dedicated museum, and February 28 is now the 'National 228 Peace Memorial Day', but these names can be seen as a form of self-censorship due to fear of controversy. Winichakul takes the position that the memorialisation of dates is overly neutral, an uncontested fact which 'speaks [only] as much as allowed' (Winichakul 2020).

At the 228 Museum, an exhibition of the work of aforementioned survivor and sculptor Chen Wu-jen aims 'to translate his misery and agony into art pieces that reminded his fellow Taiwanese they should never forget how Taiwan was ruthlessly ravaged during the February 28 Incident and the White Terror' [5]. However, the accessibility of such exhibits – artistic

interpretations of trauma, exhibited in the nation's capital city – suggests it can be difficult to provide spaces for the older, silent generations across the country to escape their 'un-forgetting' state of neither remembering nor forgetting their own memories of this time.

The Gongsheng228 organisation believes the younger, highly democratic Taiwan of the 21st century can benefit by connecting with the previous generations and their memories, to pay respect to the lives lost during the White Terror and to better understand the harsh foundations of today's freedom and the importance of celebrating a distinct Taiwanese identity [7]. They host cultural events across Taiwan on the 228 date, including a music festival in 2019. Winichakul identified a similar range of cultural events commemorating the Thai massacre as a power-shift, creating a space for the memories of the victims and opening up space for discourse (Hopkins 2020).

Less artistic prompts might also be more accessible. At the Sydney Jewish Museum in 2019, I met Holocaust survivors and heard their testimonies, often centred around an object on display such as a recipe book or a blanket. In contrast with the saintly statues of Chiang, the armchairs I conserved, worn threadbare where his arms and head once rested, create a powerful negative space, evocative of the man who sat in them. By eliciting the personal, human, bodily nature of the man who shaped Taiwan, visitors may be prompted to consider their own human, small-scale memories of that time, and the direct effect his actions had upon their lives.

Conclusion

The functional nature of a chair is both familiar and yet can suggest authority; the request of the aforementioned visitor to sit in it replayed often in my head. I imagined the variety of emotions depending on individual experiences: for this visitor the idea of sitting in the throne of a quasi-mythological figure seemed to appeal, but I remembered the disgust felt by my colleague in handling Chiang's silk-lined trousers. When I had vetoed the request to sit in the chair, it had been primarily from a material point of view, but the visitor might also interpret this prohibition as a desire to maintain the 'purity' of a chair belonging to such an important person, under which circumstances the desire to sit in it becomes an act of defiance and even defilement. Of course, it is possible to overthink and project all kinds of intentions behind the request – perhaps he was simply tired and wished to rest, a widespread challenge in the preservation of seating furniture.

It is interesting to contrast the reactions from retiree tour groups with those of a similar age who had connections to the museum sector, whose reactions were less emotional and who immediately accepted their provenance as a justifiable reason for conservation. It suggests a shared bias among cultural heritage professionals, and the importance of engaging with the wider public. Prompted by visitor questions about the purpose of conservation work, this exercise in interpreting and reflecting upon the reactions and motivations of those who interacted with me and with the chairs, demonstrated the fallacy of neutrality in conservation when working on objects with contentious associations. Departing from a supposedly objective, materials-based approach, working on public display allowed me to critique my positionality and how my identity affected the treatment and the stakeholders in multiple ways.

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Notes

[1] There were 2,804,198 total visitors to the museum in 2019, of which 12,746 attended the Open Storage (NSTM 2020).
[2] In Mandarin, polite or friendly informal conversations often revolve around one person making a statement and the other person repeating that statement in acknowledgement, rather than a direct question and answer. For example, when crossing paths with a neighbour, they might say 'You are going to work.' and I would respond accordingly 'I am going to work.' Here, I would say 'The chairs belonged to Chiang Gong' (a title commonly used to designate Chiang Kai-shek) and they would reply 'Ah, the chairs belonged to Chiang Gong' – a very non-committal way of acknowledging the information.
[3] Much to my embarrassment, I previously sent a company-wide query as to why our offices were closed on February 28th.
[4] The Minister was in 2019 publicly slapped in the face by a 67-year-old woman for her perceived 'attempts to discredit' Chiang.
[5] https://www.228.org.tw/en_exhibition-view.php?ID=8 . Accessed: 11 December 2020
[6] Chinese dialects such as Hokkien or Hakka, often grouped as 'Taiwanese language', have been violently suppressed in the past, with the imposition of first Japanese and later Mandarin as the official language of Taiwan.
[7] https://www.facebook.com/GongSheng228/ . Accessed: 11 December 2020

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Showing Off: Preparing the V&A Upholstered Furniture Collection for the Move to a New Public Facing Store

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Introduction

The majority of the V&A stores have been housed within Blythe House in West London for four decades. Built as the headquarters of the Post Office Bank, its rooms and halls are filled with cupboards and racking packed with many thousands of objects of cultural significance belonging to the V&A Museum, Science Museum and British Museum. The government owned building was sold to developers necessitating the closure of the stores and removal of all museums collections by 2023. The V&A collection will move to a new campus in Stratford, East London, currently being built on the former Olympic site. A small team of specialist conservators from different disciplines were engaged on one-to-two year contracts to prepare the collection for packing and moving. This paper will investigate one aspect of that preparation undertaken by the Textile Conservator assigned to the upholstered furniture collection.

The V&A furniture collection currently housed in the Blythe House store is under the curatorial management of the Furniture and Woodwork Department but contains over 1000 objects that have textile components. While the majority of these are items of seat furniture they also include desks, worktables, glass fronted cabinets, fire screens and sedan chairs. The show-cover textiles in these objects range from silk damasks and velvets, through wool and silk needlepoint and tapestry, linens, cottons, haircloth, leathers and hides, and a spectrum of modern synthetic fabrics. Many of the objects are very large and complex and many of the textiles now in poor condition.

In addition to a programme of remedial conservation to ensure that the collection is fit to travel, measures needed to be taken to prepare the collection for a significantly different storage environment at the new Collections Resource Centre (CRC). The new store will be public facing with the collection visually accessible to visitors from viewing areas on two levels, and public access ways reaching from the central atrium partway into the racking. The furniture collection is in many ways an obvious choice for open display in the new store as objects are robust, easily interpreted by visitors, and of a size and stability to prevent theft and to reduce the likelihood of serious damage through accidental collision. But the textile components are vulnerable to the increases in light, airflow and display soiling that come with an open storage environment. Moreover, a significant number of furniture objects have textiles that are not in a condition that it would benefit the institution to show to the public without mediating interpretation.

The decision was taken to provide light excluding storage covers for over 1000 objects in the collection that have exposed textiles. However, full dust covers have two major disadvantages in the context of relocation and open storage. Firstly, a cover while providing some protection during packing and transport might also mask vulnerable elements such as delicate carving, loose gesso, or hanging trim, and increase the risk of accidental damage

during handling. Secondly, it is likely to obscure the object for the CRC visitors and reduce the impact of the visitor experience. The decision-making processes undertaken to minimise risks and maximise the preventive advantages of covering an extensive heterogeneous collection are discussed below.

Auditing the Collection

Upholstery is often the most transient part of a piece of furniture. There are strong traditions of partial and complete re-upholstery as textiles age and fashions change. Many 19th and 20th century materials such as jute webbing, weighted silks, and polyurethane foam fall victim to inherent vice and need to be replaced. As a result, many objects in the collection show evidence of re-upholstery shortly before or after being accessioned and few have much documentation regarding these interventions.

When the Upholstery Conservator joined the Decant Project in 2019 no comprehensive condition audit of the upholstery in the collection existed. A volunteer team had listed the objects with textile components in the two furniture stores and this list formed the basis of the first extensive audit that had been made of these objects during their time at Blythe House. The primary purpose of the initial audit was to identify objects needing remedial conservation in order to travel safely, and indicate the degree of intervention required. In doing so the need for permanent storage covers across the collection became increasingly apparent. A conversation ensued between Curatorial and Conservation about how the preventive conservation needs of the textiles could be best met without seriously compromising the accessibility of the open store. It was agreed that opaque covers were necessary but that, where possible, only the textiles should be covered, leaving the frames exposed.

Choosing Materials

Choosing materials required balancing time and budgetary constraints with the requirements of aged and compromised textiles. The covers needed to provide a barrier to light and dust but have a degree of breathability to prevent the formation of microclimates. They needed to be durable enough to withstand the relocation and not to require maintenance or replacement in the short or medium term once in the new store. It was important that they were both chemically and structurally stable as they would be in long-term contact with the object and their opacity would mask any adverse consequences of proximity.

Conventional storage covers made from good quality, densely woven textiles would meet these criteria, but these materials would be expensive and time consuming to work with as they would need cut edges finished, and bolt widths would necessitate piecing to cover larger objects. Non-woven materials such as Tyvek® would be much cheaper, could be sourced in much larger bolt widths and would need far less finishing. However, Tyvek® is not as durable as a woven fabric, can become rough and discoloured in time, and cannot be effectively cleaned.

As the conservation audit had revealed, many of the objects on the list had upholstery that was of low significance due to being non-original or in very poor condition. It was decided that Tyvek® covers would be appropriate for these. Tyvek® covers would also provide sufficient protection for many of the objects with robust textiles in good condition including haircloth, chemically stable leather, and modern woven upholstery fabrics. The budgetary savings from using Tyvek® for these covers would allow more resources to be focussed elsewhere on the most vulnerable textiles in the collection.

A number of woven textiles were considered for the high-end case covers including calico, cambric, and polycotton. Eventually, downproof cotton was chosen for its superior opacity and working qualities. Because of its high thread density, it holds shape well, is resistant to fraying and tearing, and is less acidic than more cheaply produced options like calico. Its relative stiffness makes it easy to fit the silk habotai lining that some of the most vulnerable objects would require. An added advantage of its almost parchment-like surface is that, as with Tyvek®, object numbers could be written directly on the cover.

With regard to cover fixings, hook and loop tape was considered and rejected in favour of cotton tape ties throughout. During the audit several old storage covers were found, most of which were secured with hook and loop tape. It was observed that the tape had stiffened and discoloured over time and where the covers had been shifted in relation to the object, either during store reorganisation or as a result of being removed and refitted, the abrasive hooked surfaces had often come dangerously close to fragile upholstery.

A third audit was then undertaken to estimate the material quantities needed and produce an accurate budget projection.

Outsourcing Standard Covers

It was apparent from the initial survey that the Decant project conservator would not be able to produce bespoke covers for every object with a textile component within the decant timeframe. A second audit was undertaken to identify sets of objects that could be given simple standardized covers that would be able to be cost-effectively outsourced. While none of the sofas or non-seat furniture would fit into this category there were a significant number of candidates in the chairs. Basic box covers had the disadvantage that they would obscure much of the frame and profile so only chairs with a relatively boxy shape and extensive upholstery were considered.

A total of 224 chairs that had both seat and back upholstery and a relatively square footprint were identified. The majority of these dated from the early 18th to early 19th centuries, a period in which chairs were made to established patterns with generally similar dimensions. While most of the chairs in the stores are standalone objects or at best in pairs, there are a few suites from this period that were obvious candidates. These include two sets of seven salon chairs with beautiful but vulnerable original removable silk velvet showcovers *circa* 1720-30, five more of a similar date with modern reproduction bizarre silk showcovers, and a set of ten French Gondola chairs from the early 19th century with later showcovers.

The list was divided into armchairs and backstools. Rough measurements were taken of width and height from crest to arm or crest to seat rail respectively. Using these

measurements dimensions for two sizes of box cover for each group were calculated. A few objects had to be removed from the list, as they were too small or too large to be accommodated within the standards, leaving a total list of 215 chairs with four sizes of cover. These were subdivided again - according to the type and condition of upholstery materials to be covered - into Tyvek®, downproof cotton or silk lined downproof cotton.

Prototypes were made to determine whether the silk lined cotton covers could be scoured after manufacture rather than made up from fabrics scoured in advance. This would reduce the manufacturing cost, as the materials were much easier to work with straight from the roll. It was determined that the variable shrinkage was not sufficient to affect the function of the finished covers and they could be laundered on delivery.

A prototype in each material combination was made by the conservator and supplied to the outsourcer along with patterns for each size and cutting layouts for each size and material. Each cover was finished with a clear plastic pocket applied centre front so that a photograph of the chair could be attached (Figure 1).

The finished covers could be easily fitted if necessary by cutting holes in the top edge for crests or finials. Raked backs could be fitted for by drawing the back seams together at the chair waist with cotton tape passed through holes made with a hole punch (Figure 2). Both the Tyvek® and the dense downproof cotton could be cut without danger of fraying or tearing.

It was intended that this fitting could be done by a volunteer team with minimal supervision; however, by the time the covers were delivered COVID-19 restrictions had removed all volunteers from site.

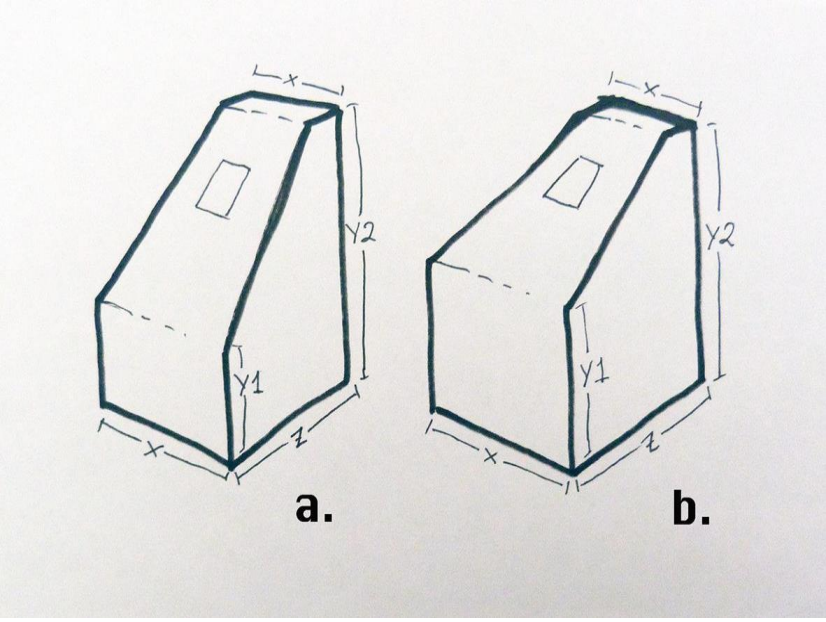

Figure 1. Patterns for box case covers for a backstool (a) and an armchair (b) with clear plastic pockets attached to the upper front face

Figure 2. A downproof cotton box cover fitted by drawing the side back seams together at the waist with cotton tape ©Isobel Harcourt/Victoria & Albert Museum

Volunteer Contribution

The Blythe House Decant had a pool of volunteers recruited at the beginning of the project to assist across the various collections. At the beginning of 2019 three volunteers, who had been working in the furniture stores rolling out barcodes and assisting with audits, were assigned to help with the conservation programme one day per week. Although they had very little sewing experience it was decided that they would be most usefully employed working on the Tyvek® storage covers as this could be done with minimal supervision and disruption to the studio space, on pre-selected groups of objects.

Following training on the Blythe House textile studio sewing machines and domestic overlocker, they were introduced to basic pattern-cutting making Tyvek® tabard covers for the fire screens in the collection. By the time these were completed they had gained confidence in measuring, machining and fitting, and were ready to move onto more complex objects.

Dining chairs with upholstered seats make up the largest class of objects in the upholstered furniture collection and it was decided that these should be given as much as possible to the volunteers to cover. Given the objective of keeping the frame visible most of these required relatively small, simple covers that were easily fitted. The objects themselves were generally small enough to be easily moved out of the racks and brought into the studio. The team

started with the late 18th and early 19th century chairs as these have generally similar proportions and three basic patterns could be adapted to fit most of them.

At this point two more volunteers were recruited, one of whom had extensive dressmaking experience and another who had worked with historic furniture for the National Trust. With a pool of five volunteers to draw from, four were able to attend most weeks and they were able to work in pairs. As they gained experience they became relatively autonomous freeing the conservator to work on other more complex studio projects. Every few weeks a side project was identified to give them some variety and a chance to see a different part of the collection. These included some surface cleaning under supervision and covers for sedan chairs, footstools and 20th century sofas.

Over the course of a year the volunteer team produced 178 covers. Unfortunately the site was closed in March 2020 due to the Covid-19 crisis and site occupancy and travel restrictions prevented them from re-joining the project at the end of September.

Strategies for Pattern Cutting

A number of strategies were developed to streamline the production of bespoke covers and ensure a uniformity of appearance across the collection. Different approaches were taken depending on how dominant the upholstery was in the overall decorative scheme of an object.

Fully Upholstered Objects

For these objects a basic box pattern was the starting point. Length (to the lower margin of the upholstery), width and depth were measured and used to calculate the size of front and back panels. The side panels were truncated or shaped where appropriate to reflect the contours of the object. The top panel was cut to agree with the top edge measurements of the four vertical panels and the five pieces sewn together leaving one of the back side edges open to be closed with cotton tape ties once fitted. This box shape could be easily tweaked to provide a better fit: pinching in corners to accommodate a domed top; a broad tuck in the front seam to take up the excess for a sofa or armchair front; holes cut for protruding crests or finials that might get damaged in transit (Figure 3). More delicate objects might require more than one seam left open to avoid any necessity to drag the cover over the upholstery textile or decorative surfaces.

This box-cover approach worked for the majority of fully upholstered objects but there were some that due to very large size or very irregular shape needed more closely fitted patterns to ensure that the cover would stay in place (Figures 4-5).

Figure 3 (left). A basic Tyvek® box cover for an armchair with an opening cut at the top back edge for the crest and a deep tuck centre front to create a convex sweep ©Isobel Harcourt/ Victoria & Albert Museum

Figure 4 (right). A fitted cover for a 20th century armchair with a highly irregular shape ©Isobel Harcourt/ Victoria & Albert Museum

Figure 5. A fitted cover for a 2.9m long early 19th century sofa ©Isobel Harcourt/ Victoria & Albert Museum

Part Upholstered Objects

In pieces of furniture where the upholstery is not extensive the frame tends to carry a great deal of the decorative scheme and is often more ornate and therefore vulnerable than with fully upholstered pieces. The approach taken with these was to leave as much of the frame exposed as possible. This category of object was primarily made up of sofas, settees, and side chairs - including the chairs on the volunteers' list. For these a pattern was taken of the horizontal seat surface and a skirt added to cover the upholstered seat rail. The cover was secured to the frame at the back with cotton tape ties or long tabs were joined with ties at the back to complete the box (Figure 6).

Where there was also an upholstered back a tabard panel could be added to the seat cover that flapped over the chair back and tied in place under the arms (Figure 7).

Figure 6 (left). Tyvek dining chair seat covers made by the volunteer team©Isobel Harcourt/ Victoria & Albert Museum

Figure 7 (right). A Tyvek® cover with a box seat and tabard back made for a part-upholstered 18th century sofa ©Isobel Harcourt/ Victoria & Albert MuseumAgain while this approach worked for the majority of the part-upholstered seat furniture some more complex objects needed more complex solutions to ensure that the textile elements were comprehensively covered and that the cover stayed securely in place (Figures 8-9).

Non-seat Furniture

The non-seat furniture objects included a number of windowed cabinets with internal lining or curtaining. It was undesirable to cover these completely for reasons of safety of carriage and ease of interpretation. Medium and heavy weight Reemay® panels were used to cover the textiles in these cases. While appropriately opaque these panels had soft edges that would not damage decorative surfaces and could have cotton tapes sewn on to them that would secure them in place (Figure 10).

Figure 8 (left). A Tyvek® part-cover suspended from the frame of a late 19th century box settle ©Isobel Harcourt/ Victoria & Albert Museum

Figure 9 (middle). A part silk-lined downproof cotton 'bib-and-braces' cover for a 19th century chair, designed to keep the elaborate and very delicate back carving exposed ©Isobel Harcourt/ Victoria & Albert Museum

Figure 10 (right). Fitted Reemay® guards for a silk curtained early 19th century cabinet. The position of a glass panel has been marked on the lower guard ©Isobel Harcourt/ Victoria & Albert Museum

Labelling

An early request from the curatorial team was that we improve the labelling of objects in the store to make them easier to identify on the higher racking. In compliance with this each cover was clearly marked with the object accession number.

Objects that had the outsourced covers and those where the majority of the frame was concealed by the cover also had a clear plastic pocket sewn on the front face in which was placed a photograph of the object. Where objects had particularly vulnerable elements such as hanging trim, loose joints or glass panels; these areas were marked up with appropriate caution labels (Figure 10).

All labelling was done with archival pigment ink pens with broad chisel nibs, which it was found produced a script that was more easily read at distance than brush or rounded nibs.

Covid-19 Legacy

On the 16th of March 2020 the UK went into lockdown in response to the rise of Covid-19 and practical work at Blythe House ceased. Two weeks later the conservation staff was furloughed and would remain off work until 20th July. At the time of lockdown 13 of the 20 months assigned to the project had been completed and the project was on target to finish the programme of remedial conservation and to deliver covers for all the upholstered

objects. Soon after returning to work it became apparent that funds would not be forthcoming to make up the three and a half months lost to the project and that it would not be considered safe to bring volunteers back on site before the November finish date.

Despite these setbacks all of the objects assigned priority 1 or 2 in the initial audit and the majority of the large and complex objects now have permanent covers. Just over 10% of the whole collection remains uncovered for the time being. The majority of these are lower priority objects that had been on the volunteer's list and it is hoped that a team can be put together to complete this work at the CRC after the store move takes place.

Conclusion

National heritage institutions are under increasing pressure to expand the accessibility of their collections and the V&A's new public facing store aims to do this by effectively putting an entire sub-collection on permanent open display. The Blythe House Decant project provided an excellent opportunity to explore ways in which the textiles in the upholstered furniture collection could be protected while preserving the visual accessibility of the objects for the viewer.

Acknowledgements

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Materials and Suppliers

- Tyvek® 1442R, flash spun high-density polyethylene sheeting
  Manufacturer by *Du Pont*, https://www.dupont.com/brands/tyvek.html
  Preservation Equipment Ltd, https://www.preservationequipment.com

- Reemay®, random-spunbonded polyester sheeting
  Manufactured by *Reemay, Inc*. (A BBA Nonwovens Company)
  Preservation Equipment Ltd, https://www.preservationequipment.com

Upholstery on Open Display: Considerations for Treatment

Heather Porter ACR, *Freelance Upholstery Conservator*

Introduction

Upholstery is a complex structure of materials and the techniques used to shape and attach them to the furniture frame. They most commonly come to conservators because the upholstery needs to be repaired or changed for display. Upholstered furniture consists of two parts – the frame and the upholstery - that are frequently altered independently of each other.

Once original upholstery has been removed a piece of furniture becomes a different object. This change is important at the time, but might become less important as time passes. Sets of furniture are often split up, moved between properties, dealers, collectors or museums to be studied, researched, displayed or used and along the way might be altered by restorers and upholsterers. With each new location their purpose, importance and appearance will differ and their histories are therefore often complex.

The conservation of upholstery is a complicated decision making process, almost certainly influenced by the requirements of location and context of display. Simply conserving what remains or removing non-original materials for replacement are not always the best treatment choices. Upholstery conservation that does not fully investigate the purpose of treatment is rarely successful.

The Display of Upholstered Furniture

Museum Collections

Many of the world's great museum collections are made up of acquisitions, objects gifted by collectors and, in the UK, objects that are assigned to museums [1]. Gaps in museum collections are filled by strategic purchases or the acceptance of particular donations to fulfil collection and display requirements. Furniture given under the Acceptance in Lieu scheme is often very high quality and sometimes portions of larger sets can be loaned back to the original property [2].

Serious collectors buy the best quality examples available and all collect things they love. They usually buy upholstered furniture because of the frame, for its design, date of manufacture, attributed maker or provenance and not because of the upholstery. Space constraints means objects are often purchased as single items or pairs rather than whole suites, and often chairs rather than sofas. Chairs are then displayed at home and consequently their upholstery is required to be functional and fashionable. As such, they have frequently been reupholstered using current materials and techniques with modern show-covers. Ironically these important pre-loved objects can be the most compromised.

Museum Gallery Displays

Individual objects displayed in museum galleries are often specifically chosen to tell a story or represent a particular design style, and curators will make use of the best available examples of furniture frames from known makers or locations with original or significantly important upholstery. Displays may also include objects where the upholstery is not original, but is acceptable, and in these cases, the condition might dictate a variety of treatment options depending on time and budget.

The conservation of showcovers, or support and adjustments to distorted under-upholstery, may be needed in both scenarios. This work might be completed in situ or require the upholstery to be at least partly deconstructed so that lower layers can be accessed, documented and treated before final reassembly.

A third class of objects will require full replacement upholstery, including the structure and show-cover, to return them to a particular appearance. Once later upholstery has been removed, these objects can offer excellent opportunities for detailed examination of the frame. A good understanding of historic upholstery techniques is required to interpret physical evidence. The position of tack holes and areas of oxidation of the wood rails can indicate the techniques and profile of original upholstery, and the position of any decorative brass nails. Tack holes can be studied under magnification for identification of fibre and colour of original showcovers and trimmings to aid replication.

Period Room Setting

Period rooms offer museums a different dynamic exhibition space when used alongside traditional museum gallery displays. They give an opportunity for groups of period objects to be displayed together, giving an impression of a complete interior. Period rooms often comprise the walls, windows, doors, and sometimes the original floors and ceilings that have been removed from buildings and reassembled. Visitors view the rooms as if they were looking in from a doorway or via a route through the room, with objects placed a safe distance behind stanchions. This allows objects to be seen from multiple sides, and it can impact treatment.

It is uncommon, but not unheard of, for the original contents of the room to survive complete [3]. More frequently, where the original contents of the room have been transferred into the museum collection, they will have been previously reupholstered and no longer reflect their original appearance. Therefore treatment may be required for aesthetic reasons. At other times, period room contents are chosen from the museum's general collection to give an impression of an historic interior, perhaps based on photographs, inventories or written descriptions. Consequently these objects become props, providing an opportunity to show examples of good quality furniture.

Date-appropriate objects with their original or period appropriate upholstery in good condition can be ideal candidates for inclusion in period rooms when an overall impression is required. These might include those with tapestry or needlework showcovers that often survive in better condition than many woven textiles [4]. Original upholstery in poor condition should not be removed from an object because it is inconvenient for display, so objects should be carefully chosen.

The upholstery profile is critical for authentic accuracy and furniture that retains the original under-upholstery is a good choice, because a replacement show-cover can be sourced and applied relatively simply (Figure 1-2) [5].

Figure 1. Sofa from a Rococo revival parlor set (MFA1982.479), dated 1850–70. Rosewood, replaced upholstery (with some elements of original under-upholstery). Object Place: Probably Boston, Massachusetts, United States. Condition before treatment with later green velvet show-covers over damaged original under-upholstery © 2021 Museum of Fine Arts, Boston

Figure 2. Sofa from a Rococo revival parlor set (MFA 1982.479), dated 1850–70. Rosewood, replaced upholstery (with some elements of original under-upholstery). Object Place: Probably Boston, Massachusetts, United States. After treatment with reproduction green silk damask applied over the conserved upholstery © 2021 Museum of Fine Arts, Boston

Lastly, objects that retain no significant upholstery give the greatest opportunities for reinterpretation and can be utilised to fulfil most period room requirements. The outcome

of treatment for these objects is not constrained by any physical evidence and can deviate from the original appearance when reinterpretation requires a pragmatic approach [6].

Historic House Interiors

Historic house interiors are complex spaces to interpret given their layers of history. Properties that are open to the public give visitors the richest environments in which to view objects in context. All interiors change over time due to curatorial interpretation, building maintenance, rotations and isolated object conservation. Consequently historic interiors are not static spaces but exist in a slow process of subtle and continuous change [7].

Many properties, or portions of them, are no longer in private ownership as homes and currently exist as visitor experiences. Some are completely original, such as the Saloon, *circa* 1730, at Houghton Hall, Norfolk, which still retains its original upholstered furniture with crimson caffoy (wool velvet) show-covers matching the wall coverings. This room is presented as an original interior and it would be hard to imagine any logic that would result in significant alteration to the upholstery, so while the condition of these objects remains fair, treatment remains minimal [8].

A vastly different approach is needed for the working Historic Royal Palaces and some privately owned country estates such as Chatsworth and Blenheim, where the level of finish is kept deliberately high. Here the requirements of upholstery treatments can lean towards replication and replacement rather than conservation.

Organizations such as the National Trust, English Heritage and others can acquire properties without contents, which then need to be assembled by purchases, donations or loans. Gathering a large collection of objects in this way often requires a high degree of interior decorating rather than scholarly research, and eventually these interiors can become outdated. The objects might not be significantly important to the property and conservation of upholstery in these settings is particularly difficult because the aim of treatment is often unclear.

Loaning objects between institutions is a good way for otherwise unseen collections to be displayed, but the risk of degradation and physical damage during the loan period must be calculated and accepted, as many years on open display will impact condition. Conservation treatment can be commissioned by the borrower to return objects to a stable condition or original appearance when the loan is recalled.

Knole House

Some objects have existed in the same property for centuries and because of their importance take on mythical status that can complicate discussions about future preservation. A good example can be seen at the Sackville family estate, Knole House in Kent, which has been partly owned by the National Trust (NT) since 1947. The NT collections include the most significant pieces of Royal Stuart furniture to survive [9].

Prior to recent research it was thought that all the upholstery was original, which would have been an astonishing survival. For this reason the prospect of undertaking any

meaningful interventive conservation treatment was met with trepidation by a succession of curators, property managers and conservators.

It was only when these objects were properly studied and archive information became available that the full extent of past alterations and the reuse of old materials was realised [10]. Some of the changes were not executed with a high degree of skill or accuracy. Over centuries, chairs were recovered, loose covers poorly fitted, extra trimmings roughly applied.

Regardless of quality, retaining these interventions faithfully with a 'light-touch' approach to conservation was hugely important to preserving the unique 'Spirit of Place' at Knole. However, some disfiguring stitched repairs on individual objects were removed; the distinction being to retain historical alterations important to the understanding of the evolution of the object, but not necessarily to preserve the history of repair techniques [11].

During the 1950's the Rural Industries Bureau took a more pragmatic approach. Some of their major interventions could not be reversed, such as re-carving large sections of missing ornament, and adhesives used as a quick fix solution on many historic fabrics eventually discoloured, failed or became embedded into the fragile textiles and cannot be reversed without complex chemical cleaning.

A small number of objects with gilded frames, including a suite *circa* 1680 comprising two armchairs, six stools and a separate daybed, were moved into the Ballroom in the 1870's and reupholstered to a high standard by professionals with new silk showcovers and fringe over new under-upholstery. By the early 20th century the new silk was in very poor condition. The full history remains unconfirmed but probably during the 1930's sections of 18th century caffoy wall coverings were cut out from behind paintings and used to cover the six stools and the daybed.

At the start of the conservation project the chairs still retained their silk covers, which were now powdering under a layer of dyed conservation net. The project required the 17th century suite to be returned to the late 19th century appearance with reproduction silk showcover and fringe. Because the daybed caffoy remained in good condition it was left in place. Consequently, after conservation, the suite and daybed are now upholstered differently, thus creating an appearance across this group that never previously existed. Arguably the Knole collection, with its complex history, is perhaps more interesting than it might have been if everything was in its entirely original condition.

Use of Case Covers

Unlike conventional gallery displays, some period rooms and historic house interiors offer an alternative to fixed upholstery in the form of period appropriate case covers. These are distinct from loose cotton covers often used for storage. Historically case covers were used to protect expensive fixed covers from use or light damage. Modern versions can be a useful option to disguise or protect fixed upholstery, and to harmonize inconsistent upholstery across a set or grouping of chairs.

Research and experience is needed to produce accurate case covers. Care must be taken to choose the correct fabric, trimmings and construction methods but even so, they can be a relatively cost effective alternative to more complex and time-consuming conservation treatments. Because the upholstery remains unaltered below, case covers also reserve the option for future treatment.

At Knole, silk taffeta case covers were made for the attendant furniture comprising two armchairs and six stools that are displayed alongside the James II bed, *circa* 1688. The whole suite retains the original cut silk velvet showcovers, now in very poor condition following unsympathetic mid-20th century adhesive and patch repairs. Although funding was secured to fully conserve the bed textiles [12], carrying out the same level of treatment on the upholstered furniture within the project deadline was not possible. Instead, the furniture is displayed with new silk case covers (Figure 3) [13]. This solution satisfies the need for historical accuracy, protection and flexibility to revisit the original velvet for future treatment.

Figure 3. Sample green silk taffeta case covers made for discussion with project team. This version has a side seam that was omitted in the final design (NT 129448.1) Knole ©National Trust/Heather Porter

The museum of Fine Arts in Boston adopted reproduction case covers in various period rooms when fixed upholstery was not suitable for display. In one example, a search through the textile collection led to the discovery of a set of original late 18th century covers that were donated to the museum along with the chairs they fitted, and these provided information for the reproductions, in material to match the period room [14].

The Colonial Williamsburg Foundation (CWF), Williamsburg, Virginia is a reconstructed 18th century town with 88 historic buildings open to the public all year round. They observe the historical process of seasonal changes to the soft furnishings and each winter reproduction case covers are applied to the furniture to represent periods of time when the properties would be 'put to bed' [15].

This simple process means the properties retain a dynamic display and visitors see interiors interpreted differently throughout the year. The covers also add protection from light and soiling for a few months each year, which prolongs the life of fixed upholstery on continuous open display. It should be noted that a significant proportion of the upholstery at CWF is being replaced because the interiors are shown at a level of finish appropriate to the 1770's [16]. Good quality replacement upholstery is expensive to produce and should also be protected to maximise its useful life.

Upholstery Construction, Degradation and Effects of Open Display

Upholstery Material

Materials used in upholstery change from century to century, 18th century upholstery can survive in better structural condition than 19th century because the quality of materials is higher.

In the 17th and 18th centuries, showcovers were usually fixed over a linen stuffing cover, whereas by the mid-19th century a layer of fibrous cotton (cotton wadding) was frequently positioned between a cotton stuffing cover and the showcover to prevent shorter lengths of lower quality horsehair stuffing poking through. When the textile becomes weak the cotton expands adding pressure and increasing the rate and severity of damage to the showcover. 19th and early 20th centuries showcovers are often in worse condition than 17th and 18th centuries examples.

The introduction of coil springs, woven jute, and poorer quality plant stuffing materials in the second quarter of the 19th century present myriad problems to the conservator. Strong iron springs are compressed between jute textiles, which eventually break down, webbing is pushed down and stuffing layers up, giving a distinctive high dome profile (Figure 4). Eventually the structure fails altogether. Conservation treatments will be extensive and must include tying the springs vertically to remove pressure on surrounding materials.

Figure 4. Side chair (MFA 1976.645), dated 1840–60. Mahogany, mahogany veneer, chestnut, original needlework upholstery. Object Place: probably Boston, Massachusetts. Profile showing high dome profile caused by expanding springs © 2021 Museum of Fine Arts, Boston

Consultation is required when deciding to remove original layers for treatment. This level of intervention of any upholstery may produce an object made of original parts, but loss of original attachments and alterations to construction mean it will no longer be the original upholstery. Complex upholstered objects with failing original materials throughout are the most difficult types of upholstered furniture to treat successfully without moving towards reconstruction, restoration and re-upholstery.

Open Display

Soiling

Without exception, horizontal surfaces on open display become more significantly soiled than vertical surfaces. Routine cleaning only removes lightweight dust, usually picked up by low suction vacuuming through a mesh barrier. Over time deep soiling accumulates and the visual difference between horizontal and vertical can become unacceptable.

Objects in historic houses on continuous open display with high visitor numbers suffer particularly badly. Sometimes colour and designs can be completely obscured by soiling but significant visual improvements can be gained by dry and damp in-situ cleaning methods (Figures 5-6). Care should be taken to limit cleaning of less soiled parts or the disparity between areas will continue.

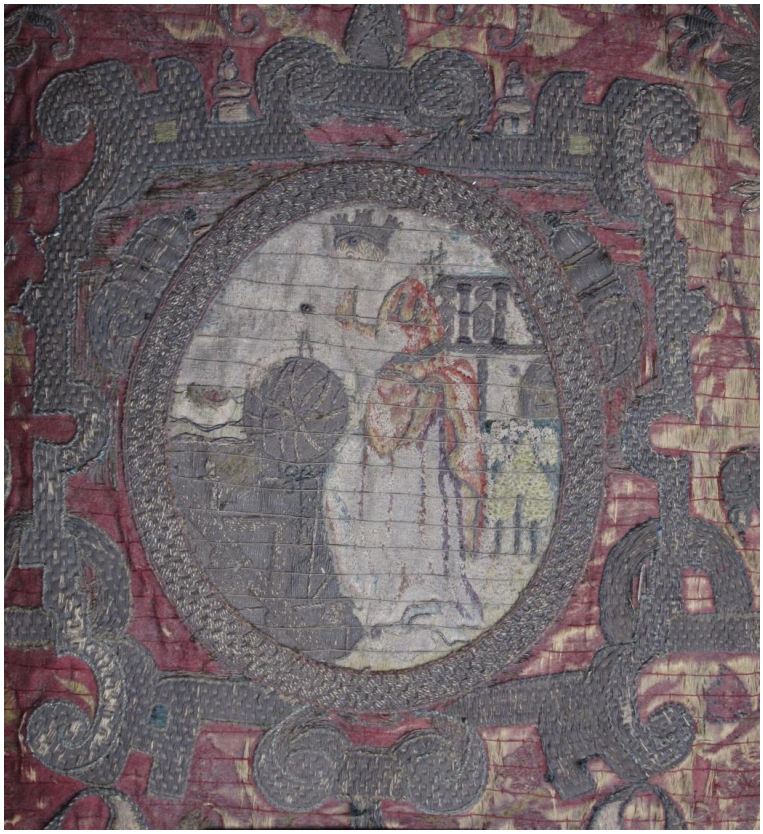

Figure 5. BT Embroidered cushion cover completely covered with grey surface soiling (NT 129438.1) Knole © National Trust/Heather Porter

Figure 6. DT Different area of the same cushion cover showing colour and texture of embroidery after initial surface cleaning (NT 129438.1) Knole © National Trust/Heather Porter

It may be possible to get better cleaning results by removing showcovers from furniture frames to enable wet cleaning, but these benefits must be weighed against potential damage to original attachments, the difficulty of reattachment and need for additional textile support. If the showcover is not original and the attachments are not important the decision to remove is less difficult.

Light

The other major display concern is light damage, which often occurs on the front edge of the seat and top half of the inside back; areas that are commonly spot-lit in traditional gallery displays. In historic houses, where there is natural light from windows, damage can be significant on light-facing vertical surfaces.

Broken warps, horizontal splits and loose hanging weft threads often require support, stitching and net overlays to secure them. Damaged showcovers on horizontal surfaces are supported by the under-upholstery below, so there is less need for structural support stitching. These surfaces can be successfully treated with dyed net overlays and stitching around the losses to the layer below.

In badly degraded fabrics with complex weaves the top surface of float threads can powder exposing the threads below, resulting in total loss of the original design. Conservation treatment cannot reverse or improve this damage and replacement with a reproduction may need to be discussed. Loss of silk threads from needlework or tapestry panels can expose the stitching canvas leaving surrounding broken threads vulnerable to further loss. However these covers can still be visually acceptable from a viewing distance, because larger areas of surviving wool still provide visual integrity.

Abrasion and Use

Objects positioned close to stanchions, or those that are only protected by a rope across the arms or by a discreet sign on the seat, are particularly prone to what is politely referred to as 'accidental use'. Visitors might take advantage of a photo opportunity or need somewhere to sit while reading interpretation materials. These events can cause little damage to modern upholstery, or conservation upholstery that is designed to withstand occasional use, but can be catastrophic and lead to the complete collapse of 19th century original jute upholstery.

Distortion of the seat profile and damage to unsupported textiles eventually need expensive conservation treatment. It can be prudent to install independent permanent supports to the underside of vulnerable seats to reduce damage. In targeted locations, stronger furniture frames and upholstery can be fitted with supports that are deliberately designed to release and fall to the floor when used, hopefully encouraging the visitor to not repeat the stunt on fragile objects! Onsite conservators can be called to reinstall the support.

Where feasible, the most vulnerable objects should be positioned as far away from visitors as possible. Less severe but notable damage can result from visitors touching showcovers or tassel fringes to see what they feel like. Sometimes damage is accidental if a visitor route travels around objects with no physical barriers between. Abrasion from brushing up against historic and modern reproduction textiles and trimmings can soon lead to damage and loss.

Conservation Upholstery

Where upholstery conservation is the treatment of extant materials, the term conservation upholstery refers to the application of new materials applied with non-intrusive or minimally damaging attachments [17].

The most successful conservation upholstery projects result from collaboration between curators and conservators, whereby the combination of object based examination, primary and secondary research and practical knowledge are brought together to make informed choices. It must be acknowledged that conservation upholstery, like all attempts at historical accuracy, will inevitably take on an unconscious level of current aesthetic and it will be necessary to review these reinterpretations.

Reproduction Showcovers and Trimmings

Reproduction textiles and trimmings can return objects to their original appearance, or be used to replace particular sections that cannot be acceptably conserved. When single objects are displayed in galleries, or whole interiors are being restored, the complete historically accurate results can be stunning [18].

However, as tempting as it might be to find unfaded areas of show-covers and trims and reproduce the vibrant original colours it can be overpowering to use them alongside faded materials, or when they are being used to reproduce only part of an object. It can be

necessary to tone down new materials by asking the dyer to match the colours to a slightly aged area.

This was the case for the reproduction silk damask used on the Ballroom suite at NT Knole. It was not possible to locate the original textile manufacturer, and due to budget constraints the original pattern could not be redrawn, so a documented mid-19th century design was chosen and woven with the same texture as the original and slightly muted colours [19]. The results blended well with the minimally conserved gilded frames and the overall appearance of the Ballroom.

Trimmings form a visually important part of upholstered furniture, but when upholstery is damaged and trimmings are more lost than extant, conserving the textile and replacing the trim can result in a more complete overall appearance. It is particularly important that the replacement matches the faded colours and worn texture of the extant fragment, ensuring the new blends with, or convincingly replaces, the old.

The construction of trimmings can be incredibly complex and faithful reproductions are very expensive but good end results can be transformative. This approach was taken on two sofas and six chairs in the Reynolds Room at Knole when the old caffoy loose covers were surface cleaned and the three reproduction tassel fringes were handmade, exactly matching the design and colour of the damaged fragments [20]. Once complete, the appearance was exactly the same as the aged original but complete in a new stable condition for long term display.

Conclusion

Conserving upholstered furniture is not straightforward. To meet display requirements it is necessary to ask the right questions before and during treatment. Best treatment decisions need to take into account display location, while condition is not necessarily important.

Objects in good condition can be totally unacceptable in some places and degraded original upholstery can be undesirable in others. Poor condition of later upholstery is no concern if it can be removed and replaced. The best upholstery treatments happen when a range of treatment options are discussed amongst a group of professionals who contribute knowledge and skills to agree a considered decision relevant to the purpose and location of display.

Notes

[1] Acceptance in lieu (AiL) is a provision in British tax law under which inheritance tax debts can be written off in exchange for the acquisition of assets of national importance to public ownership. Many National Trust properties were acquired by the charity in this way. Some objects are prevented from leaving the UK by export deferral until funds are matched and the object can be kept in UK collections, such as two stools from Warwick Castle that were sold at Sotheby's London, 4 June 2008, lot 30, and were purchased by the Victoria & Albert museum 2009 following an export deferral (V&A W.14-2009 and W.15-2009).

[2] For example two sets of chairs from Houghton Hall, Norfolk now in the V&A collection. W.1-21.2002 of which seven pieces from the set remain at the V&A and W.22-56.2002 of which 16 pieces are at the V&A. A few from each set are on display but most remain in long term storage.
[3] For example two complete interiors from John D. Rockerfeller's townhouse in New York *circa* 1881 were given to the Museum of the History of New York in 1937. These interiors were dismantled in 2009 and given to the Metropolitan Museum of Art and the Virginia Museum of Fine art to allow for museum expansion.
[4] British Galleries, Room 54, Henrietta Street Room, V&A contains a set of six backstools (w.14 to-19 -1938) *circa* 1745-1765 (made) covered with needlework *circa* 1740-1750 applied in the late 19th/ early 20th century. Modern wool serge case covers have been made for display to protect the textiles, with one chair always remaining visible as the covers are rotated.
[5] Roswell Gleason Parlour *circa* 1860 at the Museum of Fine Arts Boston made use of a suite of rococo revival furniture in the MFA collection that gave an impression of the historic interior. The suite comprised a sofa, two armchairs and four side chairs and retained the original under-upholstery with later velvet show-covers. In this case examination of the frames indicated the original showcover was green satin weave silk, but for the period room presentation a tone-on-tone green silk damask was woven to a known rococo revival strapwork design. This project was published in Heather Porter & Stephanie Rabourdin-Auffret (April 21-25, 2008) 'New support frame designs for upholstery conservation' at American Institute for Conservation of Historic and Artistic Works; Creative Collaborations, 36th Annual meeting, Denver, CO pp 38-49.
[6] The MFA displayed two worktables that were fitted with replacement bags. The table attributed to William Hook *circa* 1808 (MFA 39.555) showed evidence of red silk stitching threads that could have indicated the colour of the original bag, however for display in the Neoclassical gallery the curatorial decision was to make a reproduction bag in green silk lustring. Whereas a worktable attributed to John Seymour (MFA 1984-738) was displayed in the Oak Hill Bedroom and having no history of use in this setting it was important the reproduction bag matched the furnishing fabric throughout the room, regardless of any original evidence. This bag was made in red silk to complement the reproduction chintz bed hangings, curtains and case covers.
[7] For a full overview of the upholstery conservation process see Elizabeth Lahikainen 'Things to Consider: Ten Research Topics or Categories Used for Thorough Upholstery Treatment Decisions' in *The Forgotten History – Upholstery Conservation* (2011), Ed. Karin Lohm, Linkoping University, pp 17-29. On p19 she refers to Peter Thornton who described the process of altering historical interiors as 'slippage'.
[8] The tapestry room at Osterley House, Middlesex, survives complete with the original Gobelins tapestries on the walls and matching tapestry panels applied to the sofa and eight armchairs.
[9] Much of the 17th century furniture was possibly a perquisite of office acquired by Charles Sackville, 6th Earl of Dorset in his capacity of Lord Chamberlain to William III. Knole and the majority of its furniture were accepted by HM Treasury in part payment of death duties and transferred to the National Trust in 1946. For recent research see Emma Slocombe (2014) 'Ancient Furniture: The Display and Alteration of Upholstered Seat Furniture and Textiles associated with the Brown Gallery, Knole, in the Nineteenth Century', *Furniture History* pp 297-325.

[10] '*Inspired by Knole'* was a £19.8million building and conservation project that began in 2012, supported by the Heritage Lottery Fund, to preserve the buildings and collections at Knole and open new spaces to visitors. The project was completed in 2019.
[11] Armchair *circa* 1685-90 covered with cream coloured cotton chintz, *circa* 1760-80, embellished with silver tambour-work, embroidery and silver gilt fringe. Previously repaired and extensively stitched over all surfaces with vertical lines laid couching stitching in brown cotton. The couching stitches were removed during treatment and the chintz secured under new conservation net overlay with stitching around the losses to secure loose areas. Knole House (NT 129424.1).
[12] Conservation of the James II bed textiles was completed over a number of years at the National Trust Textile Conservation Studio at Blickling, Norfolk. Knole House (NT 129447).
[13] Thanks to Annabel Westman, Historic Furnishing Textiles, who provided the historical knowledge for the reconstruction of the silk taffeta case covers.
[14] A group of five oval back side chairs (MFA 23.22-26) came into the MFA collection at the same time as five stuffed white work and dimity case covers (MFA 23.7-11). All came from Martha Codman's estate at Bellevue, Rhode Island. Much of the furniture at Bellevue descended through the family from Oak Hill including these chairs known to come from the bedroom. The period room was installed in 1982 using floral chintz from Scalamandre and new case covers made without historical accuracy. During the Mastersite Plan project completed in 2010 a new set of chintz covers were made to the original dimity design by Natalie Larson.
[15] Historically, expensive upholstered furniture was supplied with one or more sets of case covers to be used most of the time and only removed to show off the fixed upholstery on special occasions. Original case covers rarely survive. Today it is uncommon for furniture to be displayed with reproduction case covers. Some organisations such as Historic Royal Palaces have started to use case covers in recent years at Hampton Court Palace in the Kings apartments to protect fragile fixed upholstery or harmonize show-cover colour across a set of upholstered furniture in the Communications Gallery.
[16] Objects with original upholstery are displayed in climate controlled conditions at the nearby DeWitt Wallace Decorative Art Museum, Williamsburg.
[17] Much has been written about methods of examining frames for evidence of original upholstery and various methods of non-intrusive upholstery using conservation materials. For example see Leroy Graves (2015) *Early Seating. Upholstery. Reading the Evidence* Colonial Williamsburg Foundation.
[18] The recently restored Saloon at the Royal Pavilion, Brighton was completed in 2018 after extensive research and exact replication of the original fabric design referred to as His Majesty's Geranium and Gold Colour Silk woven by Humphries Weaving, Sudbury, Suffolk; reproduction Axminster carpet, and reproduction wall decoration executed in platinum 'leaf and flower' design. The project won the Georgian Interior Category in the Georgian Group's 2019 Architectural Award.
[19] Crimson silk damask woven by Gainsborough Silk Weavings Company, Sudbury, Suffolk.
[20] Silk fringes made by Heritage Trimmings, Derby.

The Challenges of Open Display for Historic Upholstered Chairs *(Live Poster)*

Siobhan Barratt ACR, *National Trust Regional Conservator*

Figure 1. A chair at Monks House, home of Virginia Woolf @National Trust

"*There must be another life, she thought, sinking back into her chair, exasperated*" Virginia Woolf.

The National Trust owns approximately 360 houses from small unfurnished dwellings to extravagant country mansions, from houses lived in by famous authors, actors, politicians, to places renowned for their architectural beauty and interest, dating from the 12th to the 20th century. The vast majority are furnished with collections long associated with the property.

As ideas on visiting, presentation and engagement have changed over the last 125 years of the National Trust, so too have methods for managing and caring for collections. Today the majority of houses are shown on open display, visitors are invited to roam and explore freely, experiencing the house as it was when lived in.

Each property is different with its own "Spirit of Place". Presentation, conservation and how places and collections are cared for, are reflected in this individuality. In some of the grander houses important furniture and objects are protected with discreet ropes and barriers, but in more domestic settings these are kept to a minimum. This works well, but as visitor numbers grow and opening hours increase, signs of damage are becoming increasingly apparent. Upholstered furniture is one of the first objects to show signs of wear

and tear: people instinctively touch textiles, subconsciously lean on the back of chairs and sit on them, indeed sometimes people are invited to sit. Dust levels increase while time to clean decreases; very fragile textiles become too delicate to withstand this extensive cleaning.

Figure 2. Standen chair @NationalTrust

With ever more pressure on budgets for conservation and ever increasing need for access, how are balanced informed decisions made on the conservation and care of these familiar objects, and how can they be protected appropriately?

The answers lie in good multi-disciplinary collaboration and a consistent approach.

Conservation condition assessments must be considered alongside significance assessments, and access opportunities. This may require input from preventive, textile and upholstery conservators, curators and collection managers. By working together, the history and stories of the object can be revealed, discovered and shared; only once this has happened can the decisions about how to preserve or conserve the object can be made.

These decisions then need to be fully documented to ensure the discussion isn't repeated unnecessarily in 10, 20 or 50 years' time!

Figure 3. X- ray image of an X frame chair at Knole @National Trust

Case Studies and Examples

Scotney Castle is the former home of the Hussey family who lived here until 2006. It is a comfortable country house, domestic and well lived in. The collection shows the use and wear of three generations of family, but with high visitor numbers over the last 15 years it is looking distinctly tired and shabby.

There is a wish to lift the overall presentation of the rooms to show them as they may have been in their heyday of the 1950s. The significance of the collection lies within its completeness rather than individual pieces and the plan would be to replace worn and tired loose case covers with new, in appropriate fabrics and styles.

Figure 4. Scotney chairs @NationalTrust

Chartwell is the former home of Winston Churchill. When the house and collection were left to the National Trust there was a desire to maintain the high standards of presentation that would have been in place when the Churchills lived here. Therefore, periodically upholstery top covers and curtains are replaced with new.

This pair of chairs though have historic top covers that were fragile and unstable. This is restricting the cleaning and handling that could be done to them and, over the years, the springs in the seats have slowly expanded, pushing the seat fabric out of shape. Following conversations with the conservator, curator and property team it was agreed that the most important features of the chairs were the gilded frame, needlework showcover and 1950's upholstery profile, which enabled us to agree a conservation proposal.

Interestingly, during the work the upholstery conservator discovered that the proper right arm profile was squashed from use – there was evidence of an elbow indent. For many of us this is what brings the object to life, picturing Churchill using the chair, deep in thought.

Figure 5. Chartwell chair @NationalTrust

Batemans is the former home of Rudyard Kipling. The house is small, a domestic scale but obviously draws great interest from visitors. Over the last few years, rope barriers have been removed in many rooms to allow visitors to explore freely and look at the views from the windows. The top cover of this chair has been conserved on several occasions with layers of protective netting over vulnerable areas. The conservation has not withstood continued visitor traffic therefore it is not a sustainable solution if the chair is to remain in the same position. A decision has not been made yet whether to protect with a more robust case cover or conserve and move the chair to a less vulnerable position.

Ightham Mote is a property that came to the National Trust in 1985. Having changed ownership regularly over six centuries, the property bears witness to all who have made their mark upon it in some way. Its scale, intimacy and atmosphere is regularly acknowledged as being friendly, domestic and somewhere all who visit can relate to it comfortably. Over time much of the collection has been dispersed and Ightham has been refurnished with objects representing its long history. A few pieces remain from its last owner, Charles Henry Robinson, including the Library collection. Robinson did not reside for long at Ightham and his furnishings were smart, yet sparse. Over time the Library chairs have suffered from wear and tear, and lack of resources has resulted in them being repeatedly protected with antimacassars, altering the presentation considerably. The original loose covers will be documented and kept but will be replaced with new covers made in a fabric to closely match the original pattern and style.

Figure 6 (left). Batemans chair @National Trust. *Figure 7 (right).* Ightham Mote chairs @NationalTrust

Knole's upholstered furniture is well known as an internationally significant collection of early Jacobean Royal furniture. Traditionally, furniture of this importance would have had case covers made to protect from light and dust, only being removed on special occasions. Images from the late 19th and early 20th century show the remarkable survival of the collection. However, over its long history much has been repaired, restored and conserved, and the removal of traditional housekeeping methods such as case covers and good light control in the early 20th century has had an impact on the collections condition.

The Ballroom set of furniture is a good example. Physical investigation by upholstery and furniture conservators, combined with curatorial research of historic archives and images, had shown that the collection had undergone several major interventions in its history. The latest silk upholstery top covers had suffered extensive light damage and were brittle and shredded. The Ballroom was undergoing a major conservation project and there was a desire to lift the presentation.

The decision was therefore taken to reupholster the stools and chairs in a new silk, chosen to match the most recent cover as shown in early 20th century images. This decision took time and money, and many specialists were involved to agree on the best approach. The result adds to the grandeur of the new Ballroom presentation but may appear jarring when next to pieces with historic upholstery remaining.

Figure 8. Knole Ballroom chairs @Nationaltrust

The James II Bed and ensuite furniture was one of the largest conservation projects undertaken at Knole. The collection had been repaired in the 1950s and 60s and the synthetic materials and adhesives used had not aged well, becoming hard and discoloured and causing continuing damage to the original silk velvet textiles. Removing it was a huge challenge, but was remarkably successful for the bed textiles.

Unfortunately, the upholstered top covers had undergone more extensive repairs in the past and were now considered not viable for further conservation. Without the resources to be able to commission a replica silk velvet, case covers were made using traditional patterns and appropriate fabrics. This now protects what is left of the original upholstery and also creates a visual harmony with the conserved bed.

Figure 9. James II suite of furniture Knole @National Trust.

Acknowledgements

National Trust property staff at Knole, Ightham, Scotney, Batemans, Standen and Monks House; National Trust Textile Conservation Studio; National Trust Decorative Arts Conservation Studio; Heather Porter, Upholstery Conservator

DEVELOPING PRACTICE, FURNISHINGS & WALL HANGINGS

Session Two

Burghley's Textiles: The Development of Conservation Practices Within the Textile Collection

Melinda Hey and Kelly Grimshaw, *Assistant Textile Conservators, The Landi Company*

Introduction

Caring for a collection on open display is crucial in order to prolong the life of the objects. Housekeeping as a concept is not a new idea but instead has been adapted moving into the 21st century with conservation principles and professional standards in mind.

The Landi Company have been involved with the textile collection at Burghley since the early 1990s and have been caring for it through both large-scale treatments and continued housekeeping. This paper will explore how the Landi Company cares for Burghley's textile collection and consider changes in conservation practices over the years. We will compare housekeeping at Burghley with other properties and address the concerns we have for the collection, specifically in relation to its open display. We will also discuss how we liaise with numerous teams within the house on matters regarding the collection.

Introduction to Burghley House

Figure 1. Burghley House from the north-west facade ©Burghley House

Burghley House, built between 1555 and 1587, is one of the finest examples of an Elizabethan house in the country (Figure 1). Originally built by Robert Cecil, it has remained in the family for over 400 years. The interior was greatly remodelled late in the 17th century by the 5th Earl of Exeter and again in the 18th century by the 9th Earl. Nowadays the house and its contents are owned by the Burghley House Preservation Trust (BHPT) which came into being in 1981.

The house is divided into the private rooms, where direct descendants of William Cecil, the Rock family, reside and the state rooms that are open to the public. Together these major rooms number about 35. There are numerous other rooms which are occupied by staff who work at the house and still further rooms that serve as storage or remain vacant. The state rooms are generally open six days a week from March until November allowing the public a route through the house starting in the kitchen and finishing in the great hall.

Introduction to the Textiles of Burghley House

Burghley houses an extensive collection of art and artefacts that include five state beds, four of which are in the state rooms. In addition, there are 31 tapestries of which six or so are in storage. Like so many of the treasures found in the house, the tapestry collection largely reflects the input of the 5th Earl and his countess who commissioned many of them.

Although interventive conservation has been undertaken for both the tapestries and beds and many other items in both private and state rooms, for the purposes of this paper it is the twice yearly housekeeping that concerns us most.

The beds in the state rooms are found in the Black and Yellow, The Queen Elizabeth, The Blue Silk and the 2nd George bedrooms. There exists a 5th much smaller bed, known as the Victoria Bed, which is housed in the Brown Drawing Room. We will return to this later when we discuss filming in the house.

The Impact on the Collection from Being on Open Display

One of the focal aspects of Burghley is its visitors. The BHPT charity raises its income partially by charging an admission fee to visitors (Annual Report 2019). The state rooms are open for approximately 28 weeks each year, where the footfall for 2018 was 117,500, a 10% increase from 2017 (Annual Report 2019). This window of opening leaves the collection exposed to dust, pollutants, light and changes in RH and temperature.

Since textiles are complex surfaces which are not able to be wiped clean they require specialist cleaning, and dust is a particular problem. Although there is a dedicated one-way route through the house that creates a physical safeguard for the objects, they are still prone to the kick up of dust from visitor shoes.

High light levels are known to be damaging to collections with textiles being particularly vulnerable. Due to the long opening hours the windows have been fitted with blinds and shutters. UV filters were applied to some of the windows in the state rooms where objects were deemed to be at risk, a process begun in 1984 and completed in 1990, replaced once but are due for renewal.

The house is open for numerous activities including filming, private functions, special events, maintenance and needless to say, public interaction during the open season. The multi-functional use of the house is of course dictated by generating income. As such, conservation requirements need to be seen as adding value to the visitor experience. However, even when conservation has been undertaken, open display is an ongoing issue as

‘there is no doubt that display in open conditions puts a severe strain on conservation work that is perfectly adequate within an enclosed showcase’ (Landi and Marko 1980, 151). Additionally, being an external company, although we look after the collection, we are only able to advise and put in requests for conservation when necessary.

What Do We Do as Conservators

When Autumn comes we prepare the beds for the winter months, a practice which mimics the housekeeping undertaken between the 18th-19th centuries when families went to London for the social season (Lloyd and Staniforth 2000; Lloyd and Lithgow 2006). Importantly housekeeping limits the number of days that the collection is exposed and allows the collection to be examined, cleaned and covered. In recent years at Burghley minimal cleaning has been undertaken in the winter due to economics; therefore greater attention is given in the spring, with deep cleaning of the beds, tapestries and upholstered furniture ready for the open season.

When undertaking housekeeping we assess the collection, categorising the levels of deterioration and the level of imminent conservation required. At this point, as discussed by Staniforth and Lloyd (2012), thought is given to either a conservation treatment or ‘retiring’ the textile to store and replacing it with an authentic replica or substitute. The balance here is between available resources and funding, and consideration for the potential lifespan of the object against that of a replica/substitute. Cases of each can be seen at Burghley; the conservation side represented by the large interventive treatment of the Black and Yellow Bed between 1989 and 1994, versus the replacement of the counterpane and head and foot curtains of the Queen Elizabeth bed in the 1980s.

Cleaning of the tapestries has developed throughout the Landi Company’s involvement in housekeeping. Initially cleaning was only intermittent alongside the sequential quadrennial deep clean of the state beds. Now, we carry out a large scale clean of all tapestries every spring in order to help reduce the level of dust build-up.

When working in the house, we need to liaise with the curator and the house staff to arrange timings as, for example, we require scaffolding to reach the top of the beds. We also feedback pests we find as we are not primarily responsible for pest-management, this is undertaken externally by Rentokil who lay down traps and spray Constrain periodically throughout the year.

The State Room Beds

Focus is given to the four rooms with state beds, their associated tapestries and the upholstered furniture. Individual case covers have been made for the chairs and stools which slip over the top and secure with either Velcro or ties. Similarly, case covers have been made for the state beds, an idea originating from the House Curator Jon Culverhouse. Historically the state beds would have had case covers, these were listed in the inventories along with the beds themselves. The Landi Company produced covers in 1994 for the Black and Yellow bed after its conservation treatment, and then later covers were designed and

produced for the remaining three beds. Each set was crafted independently according to the individual construction of the tester.

Information about the beds and tapestries has been taken from inventories of 1688, 1738, 1763 and 1804, and recent findings. The beds have been modified in various ways and have moved around the house at different times in history, although the bed stocks and headboards are all of 17th century origin. Sets of tapestries have often been associated with particular beds and remained with them when they have been moved.

The Black and Yellow Bed

The Black and Yellow bed is one of the smaller state beds, first appearing in the inventories in 1763 (Figure 2). Black satin curtains, with yellow linings, appliquéd with pots of flowers in coloured floss silks surround the bed. The tester is of yellow satin, embroidered with wreath flowers and it dates from 1838. Finials of fine silk covered wires stand on the cornice with a fretted outline and tasselled fringe.

Figure 2. The Black and Yellow bed, in the Black and Yellow bedroom ©The Landi Company

The bed underwent large-scale conservation in 1989 by Sheila Landi which has helped stabilise it for the past 30 years. The work began with the curtains, headcloth, festoons and most of the counterpane at Landi's London workshop before she moved to Burghley House in 1992. The work was completed in 1994. During this work, a note came to light, left by the Graham sisters who did a major refurbishment in 1838, but the extent of work is only

conjecture [1]. Continued conservation was undertaken in the late 1990s by placing coloured net over the most exposed parts of the embroidery.

The bed is situated parallel to two large double windows with shutters, which are left open during the day in the house's open season. It is only for the winter closure that the shutters are permanently shut. The bedside nearest the windows has taken the brunt of the damage and been virtually destroyed. The visitor walkway is parallel to the bed's left side, less than a metre away, which is a large cause for dust settling on the top of the counterpane.

Housekeeping begins by first covering up the counterpane with a large cotton sheet. To suspend the case covers for the Black and Yellow bed, there are a series of hooks attached to the bed-frame itself, which enables ties attached to the curtains to pass underneath the fretwork and to hang parallel with the top edge of the bed (Figure 3). There are six covers in total and small sheets are placed over the fretwork. The finials are also covered with custom 'hats', with wired tops for the six smaller finials to keep the sheet away from the silk, and bamboo poles for the four larger finials to be inserted through the middle and extend above them.

Figure 3. The Black and Yellow bed with its winter covers, including the 'hats' over the finials

The Queen Elizabeth Bed

This bed is the next to be seen on the route followed by the public through the house. It is situated on the west side of the building and within the room is now set against the wall facing the window (Figure 4). Behind this wall is a corridor that houses offices currently used by staff. During open season the bed is roped off with the public passing approximately 1.5m away from the foot of the bed. The three tapestries hanging here are *The Metamorphoses,* dating from *circa* 1680 and made by the Gobelins studio in Paris. The bed case covers, seven in total, are attached on bamboo poles which hook on to hinged wooden batons attached to the roof of the bed that extend past the canopy.

Figure 4. The Queen Elizabeth bed, in the Queen Elizabeth bedroom © Burghley House

Thanks to extensive conservation treatment by Landi the bed retains its 17th century interior, including the tester, cornices, upper valances, headcloth, headboard and baseboards. However, the curtains and counterpane were beyond economic conservation; they were put into storage and replaced, reversing the original colour scheme. Where necessary the passementerie was removed, cleaned and reattached.

The Blue Silk Bed

The origins of this bed are likely to be the Red Velvet bed first recorded in 1688 on the ground floor. By 1901 both the bed and the room were known as The Blue Silk. The only remaining indication of the red velvet is on the cornice which is ornately carved and covered

with red velvet, now very worn. The bedstead is a four poster with a canopy and set on 18th century carved foot posts. On at least three occasions there have been major changes to the bed stock and recently the interior has been 'restored' to an earlier scheme of decoration. It is currently hung with dark blue velvet curtains at the head, which may be a last reminder of curtains on His Lordship's bed of 1688. The interior hangings are pale blue silk which echo the colour of the tester (Figure 5). This bed is next in the public tour and again found on the west of the house set against the wall facing the window and roped off. It is partnered with the set of Mortlake *Bacchanal* tapestries which have hung in this room since at least 1738.

The ornate cornices prevented hinged wooden batons being secured to the top of the bed. Instead, removable metal poles were attached intermittently around the tester, allowing them to poke out between the cornice carvings when needed for housekeeping. The case covers, seven in total, are attached on bamboo poles which hook onto these metal poles.

Figure 5. The Blue Silk bed, in the Blue Silk bedroom © The Landi Company

The George Bed

The George bed was originally made in 1793 by Fell and Newton, renowned cabinet makers of the day, making it the 'least old' of the four beds that we care for. Originally raised on a dais and set behind a gilded rail, records show it was 'draped with 250 yards of striped coral-coloured velvet' (Landi 2019) and an impressive 900 yards of white satin lining. A pale silk lined, button padded dome is the only remnant of its original state. The bed was altered in 1844 specifically for the visit of Queen Victoria. The outer canopy and posts were removed at this time.

The room is found on the south side of the house, thus it is flooded with sunlight in the open season (Figure 6). The bed, however, is set on the back wall of the room so not hit by direct sunlight. It is roped off so visitors are not able to approach from the sides but are encouraged to view it from a distance. It is the last of the beds seen on the tour. The Vanderbank tapestries accompany the bed depict *The Elements*.

Figure 6. The George bed, in the 2nd George room © The Landi Company

As with all the beds, having vacuumed the drapes and counterpane, the top is covered with a sheet. The George is the tallest of the bedsteads in the state rooms and like all the beds, scaffolding is needed to access the top.

Figure 7. Split wooden batons connected to a wooden structure on top of the George bed, showing both folded (during open season) and extended (for winter covers) © The Landi Company

Split wooden batons attached to a wooden structure on the top of the bed are hinged to allow the baton to fold back into the top of the canopy when not in use (see Figure 7). For the winter they are unfolded forward, extending beyond the edge of the canopy to allow the covers to be hung from them. Each baton has a metal hook in the end which corresponds to fabric loops in the case covers. There are seven covers hung on bamboo poles and a 'hat' that covers the gilded tracery at the front of the bed (Figure 8).

Figure 8. The George bed with its winter covers © The Landi Company

Concerns for the Collection

As discussed, Burghley is also a home as well as a tourist destination. The entire ground floor is the private apartments of the Rock family. The state rooms are located on the first floor. A corridor, originally used by servants, runs behind the state rooms and is currently used as offices. These differing uses create temperature fluctuations throughout the first floor, which may be a cause of the pest problem that occurs. Thus, as is so often the case with open display, it does not create the 'ideal' environment to store and house a collection.

The environment on the first floor is monitored and attempts are made to maintain an ambient temperature, this is often between 17-18°C and 55-60% RH, which are acceptable levels (Museums Galleries Scotland 2020). The first floor offices are kept at a warmer temperature than the state rooms thus creating pockets of warmth, resulting in a palatable environment for moths (Figures 9-10). Consequently, moths are found in the rooms on the west side, most notably within the Queen Elizabeth bedroom. Although no live moths have been found recently they are a recurring problem, so the bed has been further protected by covering the mattresses and backboard with Marvelseal.

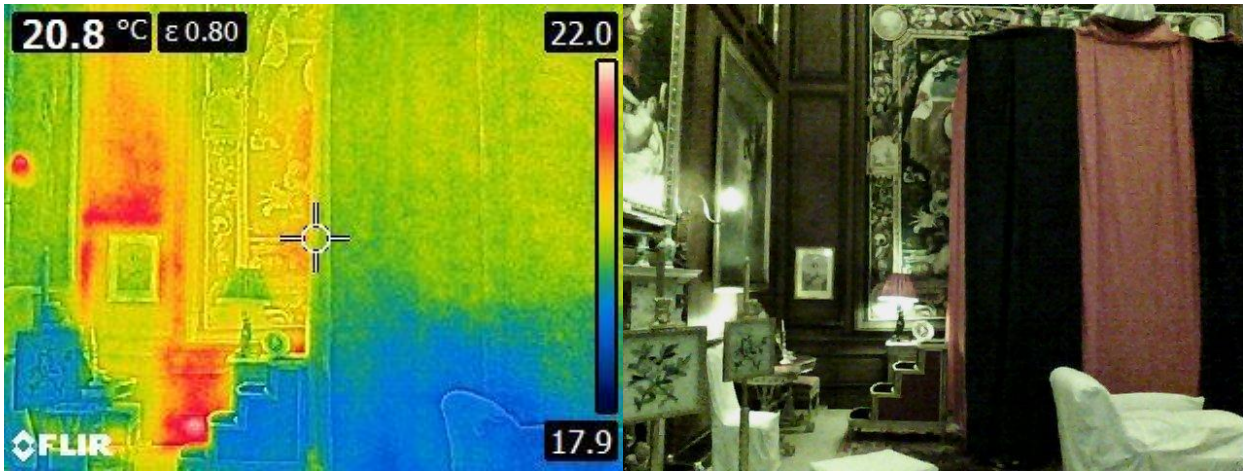

Figure 9 (left) and 10 (right). Thermal image of the back wall in the 2nd George room with the corridor running behind, with corresponding image, highlighting heat spots © The Landi Company

Being a house in Trust that is open to the public and a live-in-home, conservation is not the driving factor for looking after the collection. Ultimately, Burghley has to produce its own income and distribute these funds to needs within the house, which vary from its external environment, such as the gardens, to the building envelope and the collection itself. Thus, there is a tricky balance between funding versus the needs of the textiles.

That being said, the textiles are an integral part of the collection and are duly considered when distributing funds. Most recently we noted the top border of the *Acis and Galatea* tapestry in the Queen Elizabeth room overhanging its frame. Having not been conserved by the Landi Company, we requested the tapestry be removed during the winter 2020 housekeeping allowing us to carry out intermediary treatment. We then hope to carry out a full conservation treatment during the 2021 winter closure. Not all conservation treatment requests are as simple as this.

Like many ‘big houses’ Burghley attracts the attention of film and television crews, previously featuring in various programmes and most recently in *The Crown* on Netflix. The chances of damage are greatly increased when outside events such as building work or filming occur at properties. Such is the acknowledged risk that some conservators specialise in working alongside film crews to facilitate the moving of furniture and smooth running of filming (Fry 2020).

Filming can contribute a significant amount of income for historic houses with research indicating that being associated with a film or television show can increase visitor numbers (Fry 2020). Filming at Burghley is organised by the House Manager Philip Gompertz as one of his many responsibilities. Gompertz is mindful of the need for conservation to be considered throughout filming, most recently during the shooting of *The Crown* in November 2019. Filming was taking place in the Brown Drawing Room which contains the small Victoria Bed. The bed dates from the 1830s and is extremely fragile, it needed to be dismantled, removed from the room and stored safely (Figure 11).

Figure 11. The Victoria Bed, in the Brown Drawing Room © The Landi Company

The Landi Company was asked to disassemble the bed as the room needed to be cleared. The Victoria bed is constructed using curved brass tubing that supports the canopy. The tubing is held together with four brass finials that screw onto the top support. The finials, which keep the structure rigid, need to be rethreaded, which means the bed frame is unstable. The canopy needed to be taken down and the tubing taken apart. Filming for *The Crown* started suddenly at Burghley after the crew were let down by another property. Therefore, the house team were not able to give us notice meaning there was no time to label the bed, take suitable covers or prepare a space for it to be moved into.

Each time the bed is taken to pieces it risks the finials not reattaching; rethreading would solve this problem. This in itself has been difficult to arrange since each team within the house has a different budget and responsibilities. We asked the maintenance team first who could not act to allocate the budget, then it was mentioned to both the curator and house manager. It is this type of issue that could cause damage over time. Since the Landi Company works as contractors to Burghley House we do not carry much weight with such issues.

Although we were able to safely dismantle and store the Victoria Bed, the need to act quickly and efficiently was essential. Events such as these create risks for the collection. *The Crown* filming crew will be back after Covid-19 so we can expect similar concerns when they return. It is hoped that since this filming is known about in advance it will give us the chance to make necessary plans.

How Does Burghley Differ from Other Historic Houses

One way in which Burghley differs from other historic houses is the manner in which filming at the property is managed. The NT have a team dedicated to this, headed up by the filming and location manager whose job involves booking filming, project managing, dealing with enquiries and the actual shoot (Shawley 2019).

In terms of conservation, although there are hundreds of privately owned stately homes and historic house charities we have drawn comparisons between the NT due to its obvious prevalence in the sector, and Historic Royal Palaces (HRP) with its collection of 11 state beds in Hampton Court and Kensington Palace [2].

Most NT properties have a team of conservation assistants who work in the property all-year-round undertaking cleaning duties around the opening hours of the house. Where properties still close for winter, these teams are often assisted by volunteers who help put the house to bed. In most NT properties a high number of objects are covered and rugs are often rolled up and stored. For those houses that no longer close, the conservation assistants work before the house is opened and during some of the open hours. This is seen by the Trust as an additional attraction for visitors to see what happens behind the scenes and is known as ‘Conservation in Action’. For more complex conservation projects, specialist NT teams are called upon who may carry out the work on site or have the object taken to their conservation studio, depending on the size and nature of treatment.

At HRP, the sites remain open seven days a week, 363 days a year, except Kew Palace which closes over the winter months. The textile conservation team, who is based in Hampton Court Palace, works around the opening hours of the palaces to protect the collection. At Hampton Court Palace all state beds are on open display, although not all are on the visitor route. Those not seen by visitors are kept in darkness and at most the counterpanes are covered. When necessary, temporary protection is provided for the beds if, for example, remedial work is being undertaken nearby.

Burghley House does not have a dedicated conservation team. As well as the Landi Company, there are a furniture conservator and a fine arts conservator who have businesses on site. Alongside us they can be called upon to conserve objects when necessary. Due to the housekeeping regime we are able to assess the condition of the textile objects in our care in the state rooms. The beds and tapestries in the private rooms are only viewed upon request by the Rock family. Housekeeping is just a handful of days a year and is generally the only time that conservators are employed to care for the collection, in contrast to a permanently employed dedicated team within the house. This being said, having a smaller team and being a private historic property Burghley have some flexibility in what they choose to do with their collection and how they allow the public to interact with it.

Conclusion

The unusual relationship between the Landi Company and Burghley House offers those working in our studio to have a close relationship with the care of the textile collection. We have seen how conservation practices have developed organically from interventive large-scale treatments, to a more preventive and housekeeping focus throughout the decades. The dedication to preserving the collection is evidenced by the use of unique custom case covers for the state beds during the winter.

Nevertheless, it is becoming apparent that several objects within the textile collection are in need of subsequent conservation treatments, or perhaps 'retiring' to safeguard them for the future. The battle of a collection on open display is ongoing and we need to consider all the myriad factors discussed when planning our care of Burghley's' wonderful collection.

Acknowledgements

We would like to thank Burghley House, particularly Head Curator Jon Culverhouse, along with Ksynia Marko of the NT and Mika Takami of HRP, and lastly Sheila Landi for their support with writing this paper.

Notes

[1] During the 1990s treatment a note was discovered underneath the padding behind the fountain on the headboard, put there by the Graham sisters, daughters of an officer in the Army, who undertook the work in 1838.
[2] Information was obtained from email communications with Ksynia Marko and Mika Takami in Autumn 2020.

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Caring for Caroline: Planning the Conservation of a State Bed on Open Display

Rebecca Bissonnet ACR, *Textile Treatment Supervisor, Historic Royal Palaces*

This paper was written during the coronavirus pandemic 2020 and the following conservation came to mind emphasising that even the best laid plans can 'go awry'.

"I was thinking I should start work on the upper outer valances as they have never been treated. They missed out last time due to the fire, so were put back up having no conservation work done. What if something was to happen again and they were then the only element not to get treated?

My colleague replied, "Well what do you think will happen?"

"I don't know but we didn't know there was going to be a fire the first time round, did we? Just a thought….."

Introduction

This paper focuses on the planning and undertaking of the conservation of Queen Caroline's State Bed *circa* 1715, known simply in the studio as 'Caroline'. It is usually on open display at Hampton Court Palace (HCP). The planning of the project posed many complexities throughout, such as; yearly team rotations, previous conservation treatments and visitor expectations.

A programme was developed for dismantling the bed in stages to accommodate all these needs. Additionally, a method statement was created identifying the project parameters to ensure overall consistency of treatment and that the work carried out would have the longevity to last at least 50 years on open display. Interpretation and social media outputs were also undertaken addressing both the needs of individual elements of the bed and the visitor expectations by offering on site work. Dismantling the bed section by section and reinstating it gradually was a new approach for Historic Royal Palaces (HRP) and had both benefits and drawbacks.

The Bed

The bed was made in 1715 for George Prince of Wales (later George II) and his wife Caroline of Ansbach, for their occupation of HCP where it has remained ever since (Figure 1). It matches the Queen's Audience Chamber Throne Canopy, which was made at the same time for the Queen's Apartments. The bed, which is part of the Royal Collection, can usually be found on display in the Queen's Bedchamber at HCP (Figure 2).

Figure 1. Queen Caroline's State Bed in the Queen's Bedchamber at Hampton Court Palace, prior to the current conservation work. Royal Collection Trust©Her Majesty Queen Elizabeth II, 2017

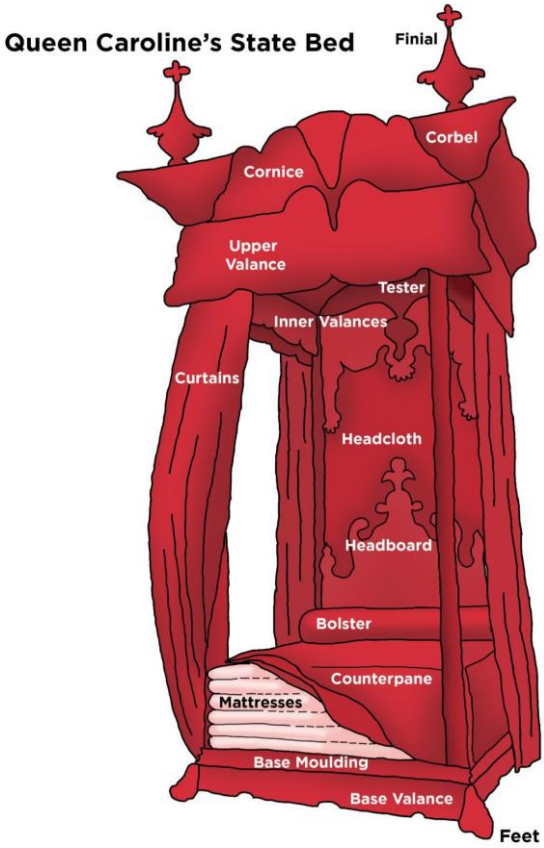

Figure 2. Drawing of the bed, created by Hannah Sutherland for Historic Royal Palaces 2018 © Historic Royal Palaces

The wooden bedframe, known as the bedstock, is approximately eight foot by six foot four inches (244cm wide by 193cm in length) and was made by joiner Richard Roberts at a cost

of £42, the equivalent of £9,241 in today's money. It is in an elaborate Marotesque style, standing sixteen feet (488cm) high. Oak bedposts with carved feet support a heavy carved full tester of pine with large carved mouldings, cornices, forearms and four finials. An ornate headboard is crowned by carved Prince of Wales feathers. Three base mouldings edge the bed base.

These parts are covered with crimson silk damask of a large compartmented foliate design known as HCP. Richard Chamberlyn supplied 282 yards of this damask at a cost of 25 shillings per yard plus 480 yards of crimson taffeta at 11 pennies per yard, totalling £264 for the cost of the taffeta and £352-10s for the damask; equivalent to £135,540 in today's money. These fabrics were used to upholster the bed by Thomas Hill and Jeran Fletcher [1].

The same damask was used for the valances, curtains and headcloth. A counterpane of a different damask, six mattresses and a bolster complete the 38 textile component parts. Laceman William Weeks supplied the six braids that emphasise the shapes and designs throughout the bed. [2]

Conservation History

To monitor the condition of objects on open display throughout the six palaces, each object is condition checked and rated on a rolling auditing cycle every two or three years. This is known as the State of the Interior Estate (SOIE). Each textile is rated on its condition, stability and treatment priority with each category being marked between one (the lowest score indicating a good rating) and four (the highest score indicating a poor rating). Once the combined rating of a textile reaches eight or above it is filtered into the rolling conservation programme. Over the past 300 years the bed has received much care and attention, with every component part receiving some level of treatment (Table 1).

Full conservation was in progress in the 1980s but this was halted in 1986 when a fire at Hampton Court tore through the King’s apartments and the conservation of the King’s Throne canopy took precedence. In 1986 the bed was returned to the bedchamber where it remained on display for another 33 years.

The bed continued to be monitored and cared for with regular condition checking and carrying out of any work as required. In 1993 a report was drawn up documenting conservation decisions and needs, which fed into a detailed condition report and estimate for future treatments.

Figure 3. *Detail of diaper couching. Royal Collection Trust ©Her Majesty Queen Elizabeth II, 2017*

Date	**Work Undertaken**
1901 - 1910 (?)	Edwardian diaper couching. Visible on many of the hanging elements including the upper outer valances, upper inner head valance and base valances (Figure 3)
1920s	Dated evidence of restoration and replacement work
1940s	Dated evidence of restoration and replacement work
1950s	Replica counterpane was made, and the original placed in store
1970s	Third mattress treated with Mystox
1981	The bed was dismantled
1985	Replacement braid bought for curtains, counterpane, backcloth and some areas of mouldings
1984-1986	Upper outer valances: relined. Velcro® attached. Dab cleaned with White spirit. Heading reinforced with taffeta strips
1984-1986	Upper inner valances: adhesive treatment using coated crepeline (Vinamul®) and sprayed with Klucel™. Cleaned with White spirit. Paraloid™ B72 0.25% sol with IMS brushed onto valances in weak areas
1984-1986	Curtains: replicas made using New English silk damask which exactly matched the originals. Curtains not trimmed with wide lace as planned
1984-1986	Headcloth: central panel temporarily replaced with a replica
1984-1986	Headboard: central panel patched with new silk damask

1984-1986	Mouldings: covered with silk crepeline in worn areas. Braid wet cleaned and reapplied
1984-1986	Cornice: foot cornice patched with new silk damask
1984-1986	Tester: two types of damask indicating replacement at some point
1984-1986	Finials: injected with Xylamon®. Fragments and loose threads adhered
1998-1999	Three panels of the headcloth were conserved and the centre panel was returned to display. The upper valances were supported at the edges using cone infills
2004	Viewing left cornice scroll adhered with cold fish glue by John Hartley of Tankerdale Ltd
2009/2010	Feet treated with adhesive net, consolidation of the braid and protective Perspex covers commissioned and made by Colin Lindley, Object and Artefact Display, London
2011	Feet retreated with Lascaux and net
2012/2013	Replica counterpane completed for Secrets of the Bedchamber exhibition by Cronin using information collected and discussed in 1993

Table 1. Showing the conservation history of the bed. Information from archived records, Historic Royal Palaces

Planning the Work

In 2014 initial planning began to enable the bed to be taken down and the conservation work to resume. At this stage the bed was assessed in situ and estimates for each component drawn up. Using these estimates as a guide, a two-year programme of conservation was scheduled to begin in 2017.

During the planning, several factors had to be considered which not only included the treatment of the individual parts, but also the impact of the disappearance of the bed on the visitor experience and the approval from the object owners, Royal Collection Trust (RCT). The bed was on display in the Queen's bedchamber at HCP and took centre stage in a room furnished with two Mortlake tapestries, a painted ceiling by William Kent and a 17th Century bed rail. The removal of the bed would leave a large empty space and impact on the presentation of the room.

The principal aim was to treat all the elements of the bed to achieve an SOIE rating of between three and seven, ensuring that the stability category was low. A secondary aim was to keep the room open to visitors during the project. Original estimates recorded that of the bed's 51 separate elements, 29 had a rating of eight or above and therefore their conservation need was the greatest. Initial planning involved focusing on the top-rated

elements, with a second phase dealing with the objects rated six and below. To achieve this, individual parts were put in SOIE order, with 12 being the highest priority objects

Once this had been done, the feasibility of treating the parts in this order was assessed. Accessibility, storage, studio space, treatment hours and treatment options were considered, as well as disruption of the visitor route.

One of the main accessibility issues was the movement of the 17th Century bed rail. This needed to be removed to enable the construction of scaffolding in order to reach and dismantle certain sections of the bed. The bedrail was not only fragile, but also had restrictions on the number of times it could be moved and by whom. Therefore, the ability to move the object had to be considered as well as its storage and return to the room.

With the criteria allocated to each element, they were ordered in a manner that would allow the bed to be partially dismantled leaving part of the bed on display for 18 months of the 24-month programme. The planning also considered the requirements and resources from other work streams (Table 2).

Task	**Team**
Survey of the bedstock	Commission Treatment
Removal of bedrail and porcelain	Preventive Conservation
Dismantle the bed	Furnishings
Remove tapestry	Tapestry, Curators
Photograph and document ceiling	Commission Treatment
Treat floor	Preventive Conservation
Re-lamping	Preventive conservation
Installation	Furnishings, Tapestry, Preventive, Curators

Table 2. Showing planning and resources from other work streams.

The planning was divided up in line with the Annual Operating Plan (AOP) which coincides with the financial year running from April to April. It is also in line with annual team rotations. By defining the plan in AOP years it was easier to inform stakeholders and accommodate staff changes. With all this information considered, the first plan for the work on the bed was drawn up, agreed and work began in October 2017 (Table 3).

Phase	AOP Year	Process
One	17/18	Removal and treatment of the finials, inner valances, bolster, base valances, base mouldings, counterpane and six mattresses
Two	18/19	Removal and treatment of the slats and slat rails check the bed stock, curtains, valance arms, outer valances, tester, cornices, head inner valances
Three	19/20	Removal and treatment of the inner coving, headboard, headcloth, bed post sleeves and feet. Site work and install

Table 3. Showing work plan divided into AOP years.

Open Display

The following factors also influenced the conservation programme.

- Treatment consistency
- Environmental conditions
- Visitors expectations
- Future care

Treatment Consistency

With the project forecast to last two and a half years and to be worked on by several conservators, consistency of treatment was paramount. This was achieved by drawing up a method statement at the start of the project. This document outlined the aims of the treatment and acted as a guide and starting point for all those working on the project. The document stated:

"Aim:

- to bring the rating of all the elements of the bed to an eight or below
- to have an overall consistency of treatment
- to preserve as much of the original as possible
- the conservation work expected to last at least 50 years on open display."

From September 2019 to March 2020, as the work progressed through the individual elements, the starting point for any new treatment was always the method statement followed by research into previously treated elements of the bed with similar construction details.

For example, the first objects to be worked on were the finials. Previous records and reports were studied along with current treatment methods to inform the treatment proposal. Once the treatment decision had been made for the finials, it was used as the starting point for any similar objects such as the headboard, cornices and feet. These were all objects of similar construction and material composition; carved wood covered in silk damask. A

similar approach was taken for all hanging textiles. The base valances were the first of these to be treated. A decision was made not to remove the historic diaper couching as it was still holding well, and it was felt that the removal of such stitching would cause more damage than do good. This was therefore the starting point for the upper outer valances.

Environmental Conditions

As with all objects on open display, the environmental conditions are of utmost importance. At HRP we have a preventive conservation team that monitors the environment throughout the rooms. The light, temperature and relative humidity (RH) are kept within recommended guidelines. Whilst these factors are monitored, dust deposition is one of the key preventive environmental elements that we considered in our conservation treatment. As already explained, the objects are cleaned on a regular cycle and this helps control the dust levels. However, dust deposition consideration was at the forefront of our thinking when it came to reinstating the bed. Often there is little we can do except recommend regular surface cleaning, but at the same time trying to balance the removal of dust with the removal of the textile fibres. On Caroline, we have been considering our options with dust protection and have used some well tested techniques in our dust battle, such as case covers for the bed post sleeves.

Two of the bed posts had original damask which had been fully conserved in the past [3]. Overall, there was very little original damask left on the bed, therefore its survival was paramount. Whilst the previous conservation work was holding well, we still needed to ensure that the treatment would last an additional 50 years on open display. With the use of case covers it was believed that not only would this add an additional level of protection but would reduce the amount of surface cleaning required and therefore this measure would help us reach our aim.

Other methods of dust protection were Perspex covers which had been made for the feet in 2009/10 [4]. Though the design of the covers was a little dated, they fulfilled their role and would therefore be a preventive measure that we would continue to use.

A new method that was trialled on Caroline was inspired by the work carried out by Zenzie Tinker Conservation Ltd on the Kedleston Hall State Bed tester (Golebiowska 2016). Looking at the levels of dust on the headboard, conservator Viola Nicastro developed *papier mâché* covers for the curved and raised area. These removable covers sit on the surface of the headboard. They not only protect the fragile and original damask from dust, but they are easily removed for surface cleaning and visually infill the areas of loss (Nicastro 2021) (Figure 4).

Figure 4. Headboard and *papier mâché*. Royal Collection Trust/©Her Majesty Queen Elizabeth II, 2017

Visitor Expectations

The removal of the bed would leave a large gap in the Queen's Bedchamber, so the visitor expectation was another factor to consider when planning and undertaking the treatment. To minimise the impact on the visitor route, a plan to remove the bed in sections, leaving parts of the object still on display, was drawn up. This would mean that the bed would have a presence in the room for all but six months of the project.

By deconstructing the bed gradually in this way, this also allowed the viewer to see elements of the object that would otherwise be hidden. Sections of the bed, such as the finials, that are usually far out of reach from the public gaze, were put on display in the bedchamber, so, whilst the visitor may have been disappointed to not see the bed as a whole, they had the opportunity to view parts of the bed that would otherwise be out of their sight. Interpretation panels were used to inform the visitor and palace warders were kept informed.

A series of short blogs (HRP 2019) were also prepared detailing the decision making and the complexities of the conservation treatments. These were posted on our website and information was also available on site. These blogs also recognised the privileged position we are in as conservators, safeguarding the hidden secrets that objects hold and sharing these with our audience.

Visitor engagement and education was also achieved by working onsite during the conservation work on the mattresses. The Queen's Gallery, next to the Queen's Bedchamber, was set up as a pop-up conservation studio, where the work on the mattresses took place over the summer of 2018 (Figure 5).

Figure 5. Pop up studio in the gallery © Historic Royal Palaces

Future Care

The bed was to be reinstated and there were no plans to take it down again, so access and re-treatability were also a treatment consideration. When choosing an adhesive, we considered how easy it would be to reapply the adhesive *in situ* should remedial care be required and considered dust protection for individual elements. Improvements to the hanging mechanisms to ease the dismantling in a salvage situation were also considered as well as the overall salvage of the bed should it be required.

What Worked

The first part of the plan went well. The finials came down easily and were conserved in good time. The lower elements of the bed, the base mouldings and counterpane were also completed in time. Visitor engagement was well received with working in the gallery on the mattresses informing the visitors and eliciting a positive response. The blogs and display of the finials were also a success. Taking the bed down in sections was manageable to plan and organise. There was time to organise storage of completed objects and reuse crates from previous projects. There was also time to assess what worked well with dismantling the bed and what could be improved. The method statement worked as a good starting point for the treatment of the objects and a useful guide for maintaining consistency of treatment.

What Needed Rethinking

Whilst working in the gallery had a positive impact on the visitors, there were several factors that were not considered. The gallery houses a set of tapestries as well as porcelain and a magnificent fireplace. Windows line one wall which was bathed in morning sun. Within the gallery the environmental condition was maintained to protect the collection. Opening the

blinds to light the room had to be carefully managed to maintain light levels appropriate for the objects already on open display within the gallery. This meant that the light levels for stitching were less than ideal. The impact being a slower pace of work and more breaks required to rest the eyes.

Another impact on the speed of work was the heat. In the summer of 2018, we had a heatwave. The room had a wall of windows with the sun powering in. With the blinds being carefully managed and the windows shut, it was stuffy and very warm in the gallery. We addressed these issues with fans directed at our feet and cooling neck scarves, but since we were in a display room, the fans had to remain static to avoid too much dust disturbance. The location of the gallery was a ten-minute walk from the studio, kitchen and toilet resulting in an additional impact on the time scale of the project. With ourselves being on display in the gallery, it also meant that we were exposed to questions and interruptions from the visitors, which while gratefully received, also impacted on the timescale.

Time Started to Slip

With all the above factors to contend with the time estimate started to slip on the work on the mattresses. Fortunately, being part of a large studio, we were able to enlist the help of conservators from other work streams and use the contingency planned in the initial stages of the project. However, as we started to work our way through the rest of the elements, it became clear that most of the estimated treatments for each element were going to take more time. As the objects came into the studio and could be examined in detail, their true condition could be assessed. Additionally, as we started to remove elements from the bed, it was realised that some of the elements such as hidden brackets holding the cornices in place and the bed slats, had not been included in the original estimates. This meant that the estimated work on 51 elements rose to 76.

Re-planning

With most of the elements coming in over their estimated time, it was clear that the project had to be recalibrated. With the bed usually being on open display there were certain expectations from the Palace, visitors and owner of the object that it would be back on display in good time as a focal point of the room. Therefore, the project needed to be re-planned to manage these expectations and accommodate the increase in estimates.

Estimates were doubled for elements where the work had not been completed to accommodate the trend in timescale seen during the first phase of the project. The original intention was to reinstate the bed in one go. However, to ensure that the artefact of great historical significance was not missing from the room and maintaining visitor expectations it was planned to reinstate the bed in sections mirroring the de-installation.

The re-planned work extended the project from two and a half to five years (although this stretched over six AOP years). The original expectation of having the bed back in situ in Spring 2020 was re-proposed as having the bed partially re-installed at this time, with staged installations over the following four years. These would be accompanied with

interpretation and a continuation of the blogs. A new team was allocated and Tankerdale Ltd booked in to help with the installation. The revised treatment could commence with the expectation of completion in 2023 (Figure 6).

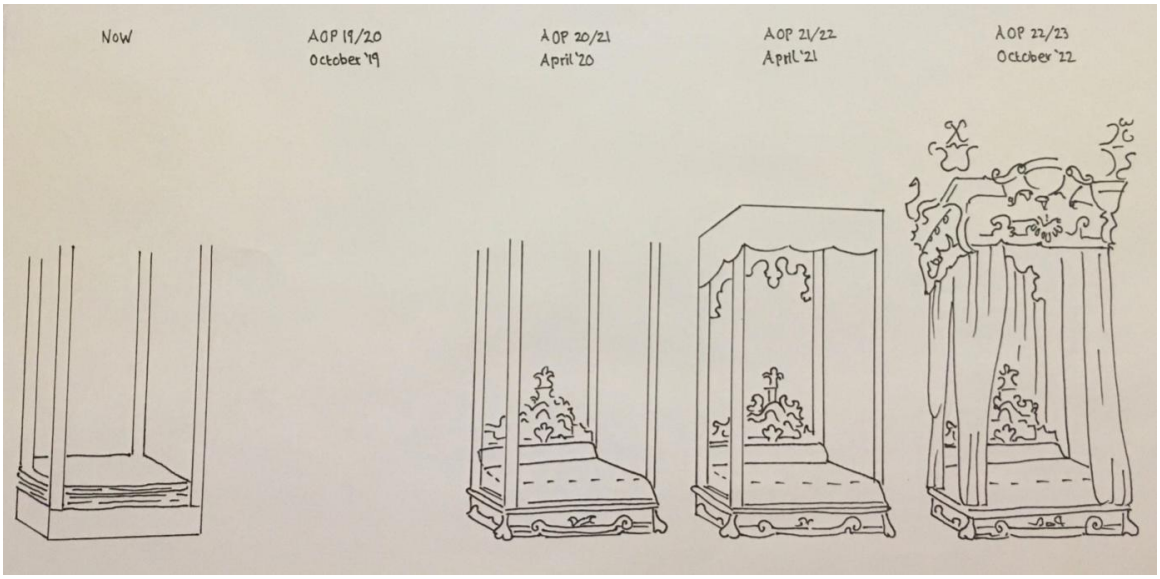

Figure 6. Diagram showing the newly planned work © Historic Royal Palaces

Conclusion

Caring for Caroline has taken considerable planning and reorganisation over the years. *In situ* estimates were used to start the planning but as elements were removed from the bed their true condition was established. The time estimates were increased, leading to a revised plan. A method statement was used to inform treatment plans and ensure a consistency of work over an extended period. Social media, information panels and on-site work helped to inform visitors and manage expectations. Whilst these were successful, they resulted in an increase in time taken on the project. On balance, and with the recent pandemic resulting in the absence of visitors, highlighting the fundamental importance of their engagement in our work, this was deemed an important and essential part of the project work.

Dismantling the bed section by section had benefits:

- tackling a large project in bite size sections was achievable for a new team
- parts of the bed could be treated and stored easily
- a continued presence in the Queen's Bedchamber to fulfil the visitor expectation
- sections of the bed were seen by the public that would otherwise remain hidden from view.

But it had its drawbacks:

- never seeing the bed dismantled with all the elements together raised questions about how everything fitted together

- onsite work hindered open treatment discussion due to the public being present.

On 19th March 2020, HRP sent their staff home to trial working from home in line with the government guidelines for the control of Covid-19. Objects were covered and information gathered for the proposed three weeks of home working. HRP remains, as much of the world does, battered and bruised from the pandemic. Many jobs have been lost across all sectors. With work on the bed on hold for the second time in its conservation history we hope to return soon to complete the treatment and welcome back visitors to share one of the Palace's most intimate treasures.

Notes

Please note that additional information regarding the condition, planning and conservation treatment of Queen Caroline's State Bed is available upon request to the author. You can get in touch via email to *Rebecca Bissonnet ACR, Textile Treatment Supervisor, Historic Royal Palaces (Rebecca.Bissonnet@hrp.org.uk).*

[1] Information from the archived conservation records. Historic Royal Palaces.
[2] Information source Historic Royal Palaces, Textile Conservation Studio. Queen Caroline's State Bed. September 2002.
[3] Information from the archived conservation records. Historic Royal Palaces.
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Acknowledgements

A special thank you to Pip Eldridge, Mika Takami and Libby Thompson for assisting with the editing of this paper. Thanks and acknowledgment go to all those that have worked on the bed both in the past and on the current project.

Glossary

- IMS – Industrial Methylated Spirit. Ethanol 98% denatured with methanol GPR RECTAPUR®
- Klucel™ G – Hydroxypropyl Cellulose. A non-ionic cellulose ether.
- Lascaux - Acrylic Adhesive
- Paraloid™ B72 - also known as Acryloid. A copolymer of ethyl methacrylate and methyl acrylate
- *Mystox - Antimicrobials, biocides. An insect-resist treatment.*
- Vinamul® - An aqueous, polyvinyl alcohol stabilized vinyl acetate ethylene copolymer.
- White spirit - White spirit (UK) or mineral spirits (US, Canada), also known as mineral turpentine (AU/NZ), turpentine substitute, and petroleum spirits, is a petroleum-derived clear liquid used as a common organic solvent in painting
- *Xylamon® - XYLADECOR 5088751 – Special Treatment Anti Woodworm matacarcomas Xylamon*

Dust Protections for a State Bed on Open Display *(Live Poster)*

Viola Nicastro, *Senior Textile Conservator at Historic Royal Palaces*

Introduction

Dust represents a big challenge for conservators caring for collections on open display. At Historic Royal Palaces (HRP) the amount of dust deposition is controlled by preventive conservation measures and by regular surface cleaning. To minimise dust deposition, barriers are located to prevent visitors getting too close to the objects and the visitors' route is designed as a one-way system where doors accessing outdoors are kept shut and are opened only if accessing the route. These preventive measures were put in place as a result of a collaborative study by HRP, National Trust and English Heritage, to understand the sources and distribution of dust and to determine housekeeping resources and optimum intervals for cleaning (Lloyd et al. 2002).

Figure 1. Queen Caroline's State Bed Headboard ©Royal Collection Trust/©H.M Queen Elizabeth II

The headboard is part of Queen Caroline's State Bed, *circa* 1715, made for George Prince of Wales (later George II) and his wife Caroline of Ansbach for their apartments at Hampton Court Palace (Figure 1). It is made of pine wood and covered in crimson silk damask. This state bed, along with all other textiles on display, is condition checked and cleaned by HRP conservators on a two or three-year basis, while all rooms are deep cleaned by the preventive conservators once a year. Despite regular cleaning and preventive conservation measures, the assessment of the headboard at the beginning of its conservation treatment [1], highlighted extensive areas of dust deposition and cementation (Figure 2-3).

Figure 2. Dust accumulated on the horizontals ©Royal Collection Trust/© H.M Queen Elizabeth II

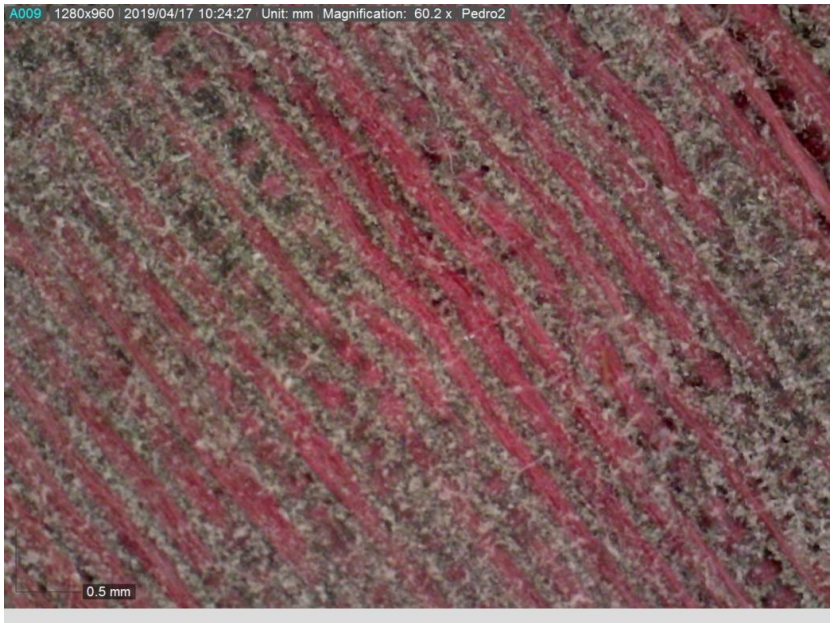

Figure 3. Cemented dust visible on the silk fibres. Image taken in opal diffused light with DinoLite portable microscope ©Historic Royal Palaces

The silk underneath the dust was also particularly fragile, and even minimal surface cleaning with a low-powered suction resulted in fibre loss. Therefore, it was decided to remove the dust only where necessary, by surface cleaning and localised mechanical cleaning. Even after the treatment was completed, it was clear that the risk of further fibres loss during future cleaning cycles was high. To address this problem, a technique to create moulded protective dust covers was explored.

Background

The idea behind dust covers was to create something to rest on the most vulnerable and sculptured areas of the object, to protect them from dust deposition and therefore, minimise the need of cleaning.

The requirements of the dust covers were the following: they should be completely removable, so they could be replaced when dust would re-deposit; they should blend with the overall look of the headboard; they should mould around the required shape; all materials should be inert. Fabric and painted Reemay® were initially considered but these were discarded as they needed to be anchored to the object.

A paper presented at the Icon Colour symposium in 2019 (Zinker *et al.* 2019) gave the inspiration to create a *papier-mâché* shell, covered in colour-matching silk, to act as dust protection. During the symposium, Zenzie Tinker and colleagues explained how they used a moulded *papier-mâché* layer, covered with replica silk, to re-cover the inside of the Kedleston Hall State Bed tester, whilst preserving the original underneath.

The *papier-mâché* was made with four layers of Japanese paper adhered with wheat-starch paste and moulded on the object, which was pre-covered in aluminium foil for protection. Once the paper was set, fabric was then adhered to it using Beva® film reactivated by heat.

Methodology

A mock-up of wood was used to replicate the sculptured areas of the headboard, to evaluate the best methodology and materials as well as the effectiveness of this method.

Different types and weights of foil were tried to find the best thickness to use to protect the object, before laying the *papier-mâché* on to create the mould.

In detail:

- Moistop barrier foil
- Waitrose Essential aluminium foil
- Lakeland extra thick foil
- Multifoil aluminium foil gauge 0.075 mm, temper-soft, alloy 1200
- Multifoil aluminium foil gauge 0.060 mm, temper-soft, alloy 1200
- Multifoil aluminium foil gauge 0.050 mm, temper-soft, alloy 1200
- Multifoil aluminium foil gauge 0.040 mm, temper-soft, alloy 1200

The *papier-mâché* was created by overlapping four layers of Kozuke Japanese paper, pre-cut to shape using a tissue template. The layers were adhered with archival wheat-starch paste and left to dry overnight on the foil. Once dry, the moulded *papier-mâché* was covered in colour matching silk habotai or silk taffeta, using thin Beva® film (Figure 4).

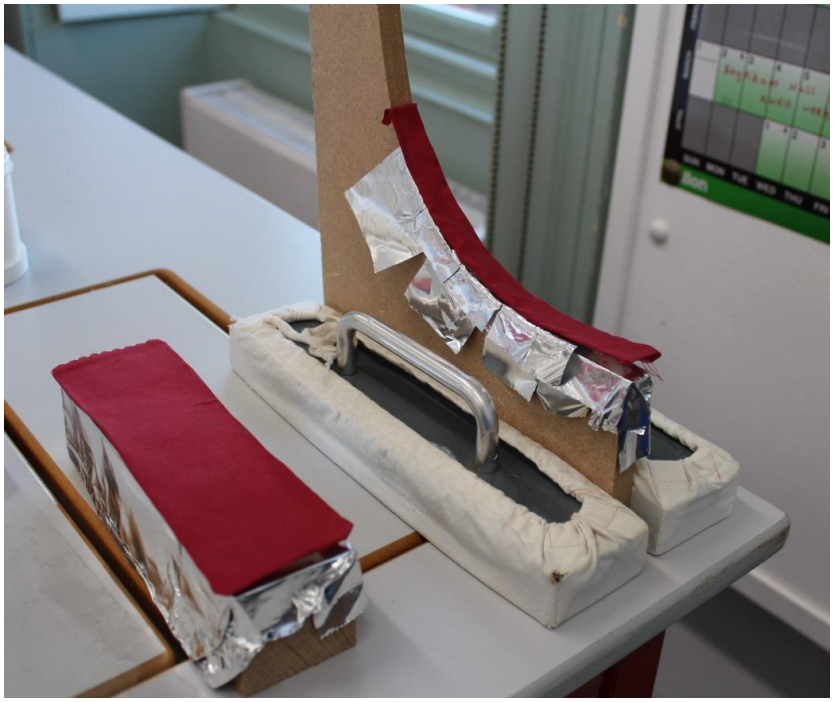

Figure 4. Papier-mâché trials ©Historic Royal Palaces

This method was then tested on a discreet area of the headboard using the same procedure. As the original silk was particularly fragile, a layer of Reemay® was placed underneath the foil to protect it from direct contact with the foil. A layer of Melinex® was also applied to the top of the *papier-mâché* to avoid the Japanese paper wrinkling during the drying stage.

Discussion and Results

Following testing on the mock-up and on the object, it was found that the best option for the foil was Multifoil aluminium foil gauge 0.040 mm, temper-soft, alloy 1200. This was strong enough to keep the shape, but still flexible enough to create a smooth curve and to bend where needed without creating sharp edges. The other options were found unsuitable.

In detail:

- Moistop didn't keep the shape and it was slippery
- Lakeland foil was too thin
- Waitrose foil worked on the mock-up, but it was found not thick enough to keep the shape on the real object, where the curve was very sharp

Kozuke Japanese paper and wheat-starch paste created a *papier-mâché* mould that was flexible enough to be manipulated to the shape of the object and to rest on it safely. Its flexibility guaranteed extra manipulation after drying when needed.

Silk habotai fabric was found to be too matte to be used as a cover, resulting in the dust protection being too visible; in contrast, silk taffeta blended well with the object, so it was selected for this purpose (Figure 5).

Figure 5. Bottom left scroll before treatment (left), with foil-barrier applied to accommodate the *papier-mâché* (middle) and after the *papier-mâché* dust protection was applied (right) ©Royal Collection Trust/© H.M Queen Elizabeth II

Conclusions

This method proved successful in creating removable dust protections that blended in with the overall look of the headboard. Where there were extensive areas of loss, the dust protections acted as a visual infill, combining conservation and aesthetics (Figure 6).

Figure 6. Area of silk loss before treatment (left) and after the *papier-mâché* dust protection was applied (right) ©Royal Collection Trust/© H.M Queen Elizabeth II

A colour-matching taffeta case cover was also created for the damask at the bottom panel, to protect it from dust deposition and to create an extra barrier from the mattresses (Figure 7).

Figure 7. Headboard after treatment with all dust protections in place ©Royal Collection Trust/© H.M Queen Elizabeth II

The dust protections were applied to cover the original silk where it is most vulnerable at the areas where dust accumulates (Figure 8).

Figure 8. Diagram of dust protections location ©Royal Collection Trust/© H.M Queen Elizabeth II

However, it wasn't possible to cover all the areas in need. Where the headboard was too sculptured, it was difficult to create a cover that would sit in position and not be visible (Figure 9). In the areas where the curve was too sharp, the cover would not sit in position. Moreover, the attempt of wrapping the foil around these areas would have damaged the already fragile silk.

Figure 9. Uncovered area ©Royal Collection Trust/© H.M Queen Elizabeth II

The matter of covering more sculptured areas was addressed during the treatment of Queen Caroline's state bed valance arms, where a mixture of *papier-mâché* dust protections and crepeline overlay anchored with wheat-starch paste was used. The crepeline overlay was applied to cover the curviest parts of the valance arms, where the *papier-mâché* wouldn't sit safely. This was anchored to the braid on the sides using wheat-starch paste (Figure 10). This adhesive is reversible in water, so the overlay could be replaced if needed. In this instance, this method worked well not just as a cover, but as a more permanent treatment for the very fragile silk.

Figure 10. Area of silk loss before treatment (left) and after the crepeline overlay was applied (right) ©Royal Collection Trust/© H.M Queen Elizabeth I

Reflecting on this experience, the use of silk covered *papier-mâché* has opened up interesting possibilities for future use on other projects, in particular for state beds on open display. However, this technique is limited to less sculptured shapes.

The dust protectors will be monitored over three years, with the help of the preventive conservation team, to understand at what stage the dust becomes cemented on the silk. The results of these investigations will inform us how to best balance the need of surface cleaning and dust protections on fragile state beds on open display.

Acknowledgements

I would like to thank Zenzie Tinker and Geoffrey Major for their generosity in sharing their experience in creating *papier-mâché* covers.

Notes

[1] The treatment of the headboard is part of the conservation treatment of the entire Queen Caroline's state bed, which began in 2017 and it is currently ongoing (Bissonnet 2021).

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Materials and Suppliers

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- BEVA® 371 Film, thin. Kremer Pigmente https://www.kremer-pigmente.com/
- Kozuke Japanese Paper. Shepherds inc. Falkiner Fine Papers. 30 Gillingham Street, London, SW1V 1HU
- Reemay®. Conservation Resources UK Ltd http://www.conservation-resources.co.uk
- Wheat-starch paste. Conservation Resources UK Ltd http://www.conservation-resources.co.uk

Pink for all Seasons. Onsite Treatment of Silk Wall Coverings at Castletown House, Celbridge, Ireland (2015 – 2018) and Arlington Court, Barnstaple, Devon (2019)

Ksynia Marko ACR and May Berkouwer ACR, *Freelance Textile Conservators*

This paper focuses on the treatment of silk wall coverings as found in two different historic settings. The connection between them lies in the challenging decisions made over time for their conservation, work carried out in a climate of uncertainty, experimentation and changing views between conservation and replication and, not least, concerns over cost.

Castletown House. Introduction

'This project recognises the importance of aged and conserved textiles in aiding the aesthetic appreciation of an historic interior: the conserved Red Drawing Room walls will offer an atmospheric context for the collections' [1].

Castletown House is Ireland's earliest and largest neo-Palladian country house and, like Arlington Court, is open to the public. Built between 1722 and 1729 for William Conolly (1662-1729), Speaker of the Irish House of Commons, Castletown was intended as a political and social centre commensurate with his influence and wealth. However, by the early 20th century family fortunes had become depleted with little investment into the upkeep of the house until it was sold at auction in 1965. First opened to the public in 1967 it came into State ownership in 1994, by which time the house's interior and exterior structures needed extensive repairs.

The Office of Public Works (OPW) in Ireland, which owns and operates the house and estate, initially focused attention on urgent and necessary building works, on controlling the internal environment and developing and conserving the parkland. Concerns had been raised about the condition of the 19th century silk wall hangings in the Red Drawing Room, but the main focus, in terms of presentation of the house to visitors, had been based on the property's heyday in the 18th century to the exclusion of later periods.

During the 1985 restoration of the Green Drawing Room, next door to the Red Drawing Room, fragments of pale green Spitalfields silk, *circa* 1760's, were uncovered and the room was subsequently restored with green silk woven in France in an attempt to return it to its former appearance [2]. However, it is known that both rooms were rehung with new silk during a refurbishment scheme carried out by Thomas Conolly II (1823-1876) in the 1870's and so today the crimson and white figured silk damask remaining in the Red Drawing Room is considered historically significant, despite its condition (Figure 1) [3].

Figure 1. The Red Drawing Room at Castletown looking towards the west wall, before conservation. The hanging pictures obscure much of the damage, some of which can be seen above and to the left of the door © May Berkouwer

Assessment of Environment and Condition

Fluctuating environmental conditions over many years had caused a great deal of physical damage to the silk on all walls, as had excessive exposure to light. The south wall facing the windows was in an advanced state of decay; the north wall, in the best condition, had still suffered large losses around the doors in both corners of the room from wear and handling.

Beneath the silk coverings, the walls are plastered, boarded with wood and fully covered with hessian fabric overlaid with sheets of blue-grey paper. These base layers had prevented airflow from the wall behind, minimising discolouration and darkening of the silk. However, surface dust had dulled the silk's appearance, as any routine surface cleaning had been inhibited by the fragility of the fabric.

The walls of the building itself had moved, as was most obvious around the fireplace where the exposed hessian and paper ground layer was split. Elsewhere, splits in the silk did not always correspond with those in the paper and hessian. The silk had 'fractured' across the warp, creating long, ragged splits running horizontally through fabric widths at various heights to a greater or lesser extent on each wall. The tightly woven selvedges and seam joins had pulled against the main body of the silk, exacerbating the problem. Wide vertical gaps occurred where seams had split between fabric widths, revealing the grey paper-lining beneath and resulting in loss of tension across the wall. In places the silk was distorted with diagonal pulls on the fabric where fixings had not allowed movement as tension had been released elsewhere. Hence the fabric appeared to have dramatically shrunk in both width and length (Figure 2).

Figure 2. Example of split silk on the south wall to the right of the fireplace. On the left a large patch of silk from curtains of the same fabric had been glued over an extremely damaged area, and white net had further been stapled over the silk as a means of protection © Ksynia Marko

The relationship between the wall structure, past movement and damage to the silk needed closer assessment as any future structural movement would obviously affect the silk, conserved or not, and the stability of the environment needed to be assured before spending money on a lengthy programme of conservation.

Five different surveys and treatment proposals had been commissioned between 1991 and 2005. An advisory visit was made to assess each of the proposals (Marko 2006). All treatment suggestions had points to recommend them, as well as posing risks, and the report recommended monitoring and further investigation.

By 2012 temperature and humidity levels were being regularly monitored, UV blinds and UV film were in place, and a strict housekeeping regime followed. Apart from some unfortunate mechanical damage caused by picture handling, no further splitting of the silk was recorded. It was time to focus on options and to refresh the debate regarding both ethical and aesthetic considerations of conservation versus replication on which opinions were divided.

Discussions with the OPW and the Castletown Foundation, both funding bodies, were held to define curatorial priorities, the risks involved and appropriate treatment. This underlined the importance of viewing the silk, not in isolation, but within its setting, in relation to the furnishings within the room, the context of the room as part of the enfilade through the north side of the house, and the overall philosophy of presentation and interpretation for the whole property, recognising its multi-layered history.

Onsite Treatment. Challenges and Solutions

'...the long term objective is to preserve for future generations one of the most important houses in Ireland and one of significance in terms of European architectural heritage...' [4].

The silk damask covers the full wall space from above the dado up to the cornice, and is fitted around door casements on both east and west walls, around the fireplace on the south wall and on either side of the three windows and above two mirrors on the north wall. The edges are turned back by a few centimetres with securing tacks concealed behind a decorative, gilded wood fillet. The fillets were removed prior to treatment of the silk together with modern hooks, screws and bolts, but historic picture fixings were left in place. The fabric drops on each wall were recorded, mapped with areas of concern and numbered for ease of reference during working, and to provide clarity in both written and photographic documentation.

On site work started tentatively in November 2015 with treatment trials on the west wall. The aim was to explore how well proposed treatment options might work in practice, and how far these might be taken without risk of further damage. At the same time, colour-matching of support fabrics and protective layers was refined. This first trial week produced encouraging results and work continued in 2016, moving on to the east wall in Autumn 2017, and finally the north and south walls in 2018 whilst all the time refining the methodology. After each session plans were drawn up for the next phase, treatment assessed, records made, materials checked and samples and information supplied to property staff for visitor engagement.

Remedial treatment commenced with slow and methodical surface cleaning, but this was limited due to the fragility of the silk surface, especially the white patterned areas where fibres were easily dislodged. Although time consuming, a reasonable result was achieved using a museum vacuum set on low suction (40mb) and a soft brush to lift the dust towards the nozzle. Polyurethane sponges were used to lift surface soiling collected along the top and bottom edges where the silk was in better condition.

Undyed net had been stapled over several fragile areas on each wall. Red dyed net had also been adhered to the face using Beva®371, placed over areas of fragmented silk on the south wall, and adjacent to the door on the west wall [5]. Whilst these first-aid repairs had offered some initial support they were unsightly and had been crudely applied. The heavy staples were lifted, the loose net removed and, using a small brush, the adhered net released with the careful application of Industrial Methylated Spirits. The damaged silk was then effectively secured using temporary ‘bandages’ taken from offcuts of crèpeline coated with 25% Vinamul 3252. These were finger-pressed in place.

Tacks were removed along the lower edges to release the tension in the silk. Slow humidification was achieved by constructing a lightweight polythene ‘tent’ over the affected areas and beneath this, laying rolls of dampened cotton and paper towels on polythene along the dado rail. These were left overnight and the next day the position of the silk could be gradually eased and adjusted. Horizontal splits were realigned step-by-step, again using temporary bandages, prior to adding further support on the reverse (Figure 3).

Figure 3. Detail of west wall. The silk was slowly humidified by creating a polythene 'tent' and splits eased together and secured with 'bandages' of adhesive-coated crèpeline, before applying a support on the reverse © May Berkouwer

Access to the reverse side of the silk was necessary to introduce localized supports of adhesive coated silk crèpeline. Smaller splits nearest the dado rail were treated first to work out the technique, progressing to the more complex areas with increased experience. The crèpeline was dyed to match and coated with a 1:1 ratio of Lascaux 360 and 498 adhesive, applied in a 20% solution in deionised water. Whilst still supported on thin polythene, it was cut to correspond to the width of the silk from selvedge to selvedge by the appropriate height. The polythene alone was cut vertically into sections and a long length of cotton thread was attached to the top corner of each. Once in place behind the silk, the polythene could be slowly removed from the crèpeline by pulling on the threads and, working from the face, the crèpeline could be heat-sealed to the reverse of the silk, using a heated spatula and small iron.

Support and infill of missing areas and open seams was also undertaken; the approach varied depending on the size of losses and ease of access. Where access was possible, lengths of dyed Fuji silk used for infill were stapled to the wall. In other areas and for smaller holes, Beva®371 tape was first adhered to the reverse of the infill fabric and used to attach the inserted silk to the paper-lining behind the hole. Beva®371 tape was then used again to secure the supported silk damask in place over the top. This worked well as it was not possible to undertake any stitched support treatment (Figure 4-5).

Figure 4. Detail of damaged silk on the east wall before treatment © Ksynia Marko

Figure 5. Detail of the east wall after treatment. Adhesive coated silk crèpeline was applied to the reverse and, once the silk could be handled safely a dyed, Fuji silk infill was stapled to the wall, and an overlay of adhesive coated conservation net was applied over the whole drop before finally reattaching the silk to the wall with stainless steel staples © May Berkouwer

One length of silk above the door on the west wall had to be entirely removed as the distortion here was particularly disfiguring with the need to realign pulled seams on either side. A crèpeline support was applied on the reverse and an adhesive net overlay on the

face. During removal and reinstatement, the silk was carried on a Correx board and secured with tapes. Three drops of silk were also removed above a mirror on the north wall, again supported onto crèpeline, reattached to a piece previously removed for cleaning tests, and the whole reinstated.

Overall, there were about five open seams where the selvedge of the silk remained visible, and here two layers of dyed silk crèpeline were applied to knock back the brighter colours of the selvedge in order to achieve greater visual harmony when viewing the room as a whole. The fabric in each of the lower corners of the north wall was either missing or splitting, exacerbated by the position of electric light switches. These were removed, the fragile silk secured and new replica silk placed over the top up to the height of the door frame, in order to harmonise with the new curtains.

The Final Phase

The last phase of work was concentrated on the south wall, which was by far the worst in condition and the most daunting in practice. Accumulations of dust, losses, splits, distortions, overlays of net and glued fabric taken from the original window curtains, were all dealt with using techniques developed on the other walls. The silk had faded badly where it had been exposed between paintings and had discoloured to a light orange/brown in the lower sections and over the fireplace.

The initial idea was to stretch dyed conservation net in three wide pieces across the whole wall, both as a means of protection and for harmonizing any disparity of colour. Whilst this is a reversible process, stretched net can be highly vulnerable over such a large area, with tension being lost over time and the possibility of being damaged during handling of picture frames. The team had discussed the pros and cons of the idea many times, and at great length. Having gained more confidence in facing a few specific areas with adhesive-coated net on the other walls, the idea of extending this to cover the entire south wall became more plausible as a longer-term solution. Its success lay in relaxing the tension of the net after the adhesive coating had dried and before applying and heat-sealing it to the wall.

The net was prepared with a light coating of 11% Lascaux adhesive and carefully removed from the polythene substrate on site and left to relax. Measured lengths, each covering two drops of silk, were handled by three people and positioned along the top edge of the wall before adjusting and smoothing it in place down to the dado rail. Allowing an overlap of one centimetre along seam joins, the net was heat-sealed in place using an iron over silicone paper. The lower edge of the silk on each wall was finally reattached using stainless steel staples through an intermediate isolating layer of Melinex® for easier removal in the future if necessary.

Apart from the conservation treatment, a key factor in the overall success of the project and reinstatement of the room's authenticity, described in an article by Graham Hickey as, *'a fusion of faded grandeur and unbridled luxury'* [6], was the replication of the silk to make new curtains for the three windows.

In 2014 Humphries Weaving Company carried out analysis using a piece of silk removed from the north wall and a tiny fragment from under the gilt fillet [7]. Sets of samples were

woven for comparison of weave and colour and in 2017 the fabric for the curtains was commissioned, with extra being woven to cover the large missing areas on the north wall. Working from the available archival material Annabel Westman [8] designed a template for a fringed valance, trimmings and draw curtains all made up and installed by David Faulkner [9] in 2018. A set of chairs belonging to the room was also reupholstered with the new replica silk.

The Boudoir at Arlington Court. Introduction

The Regency house of Arlington Court was completed in 1823 and has been home to eleven generations of the Chichester family. In 1945 Miss Rosalie Chichester gave the house and estate to the National Trust and continued to live there until her death in 1949. Post-war building regulations and a scarcity of funds meant that much of the collection was sold off and very little conservation work was carried out.

Absence of any historic room-by-room inventories left the Trust with little evidence of the history of the small Boudoir located on the ground floor, but the three surviving original interiors of the Morning Room, Ante Room and Boudoir, appear to have been left untouched and were thought to date from around the 1820's [10]. By 1975 the Boudoir silk was reported to have been totally damaged either side of the door and as a consequence protective Perspex panels were installed [11].

By the late 1980's and early 1990's records show that there were continuing issues regarding the fragility of the silk and initially, as at Castletown, there was divided opinion between conservation and replication. There comes a point when textiles need to be removed from display if they are no longer adequate for purpose, in order to preserve what historic evidence is left. The difficulty is deciding when this point has been reached. It is further complicated by significance, either as an individual item or, as we have seen in the case of Castletown, part of the wider context of presentation of the whole property.

In 1989 Humphries Weaving Company provided initial information for reproduction, but more research was required before final decisions were made and subsequently the importance of the Arlington silk soon became evident.

Twenty drops of silk cover three walls of this intimate room, each displaying a design repeat of some 364 cm, woven in white, cream and green (now faded) on a pink ground [12]. The silk had previously been attributed to Spitalfields [13] but in 2016 an enquiry made by Paula Martin, House and Collections Manager at Arlington, to La Maison des Canuts in Lyon, established that the pattern is in fact closely related to Lampas 6528, originally a brocade used in the Queen's room at Versailles in 1784, and still being woven as a damask as late as 1892. The design is delicate and elaborate, and includes imagery of flowers, garlands, strings of pearls, butterflies and maybugs. The Arlington version [14] distinguishes itself by the oval motif containing a pair of doves rather than the cherubs seen in Lampas 6528 (Figure 6).

'...it would be tempting to attribute the hangings and the tinting of the ceiling in lilac, pink and white to the time of Sir John's marriage, ...the damask with its loops of pearls that would recall Marie Antoinette's celebrated 'collier de la reine' (the Queen's necklace) *and so seem suitable for an early Victorian lady's room.'* [15]

Buying Time

On site conservation treatment was first carried out in 1991 (Hutton and Lennard). Split and missing areas were infilled with a dyed silk and supported onto silk crèpeline treated with 40% Vinnapas EP1 adhesive, each wall then overlaid with dyed and stretched conservation net, hand-sewn to the silk around the edge of the walls.

Some 24 years later, in two separate survey reports (Mecklenburgh 2014, Marko 2015) it was noted that this treatment was beginning to fail. Whilst some parts remained adhered to the dyed silk infill, other areas had become detached. Fragments of silk were coming away, being held only between the silk and net overlay or having fallen between the silk and the wall; as a result the exposed silk crèpeline support layer itself had degraded. Dust had accumulated on the surface of the net overlay, which was now sagging and somewhat distorted.

In 2015 detailed monitoring was undertaken and using an earlier sketch plan [16], the layout and position of seams and areas of deterioration were plotted. Relative humidity levels were recorded as being in the 70-80% range and spots of active mould growth were reported on both the net and the silk itself.

Since 2006 the Boudoir has been shown in semi-darkness with window blinds closed, curtains drawn and lit by three lamps, with visitors only entering the room part way in order to protect the fragile silk.

Options, Decision-making and Discoveries

The main options under discussion were: leave as is for the foreseeable future; repeat in situ treatment similar to that carried out in 1991, or remove and archive the original and replace with a woven replica. The partial or full removal of the silk to enable an application of a full backing support was also considered but the risks in terms of further damage and loss during handling, together with difficulties of reinstatement, quite apart from sacrificing the significance of the historic hanging construction, meant that this option was not advised. Partly encouraged by the success experienced at Castletown, the vote finally fell heavily on the side of conservation.

In 2017 another survey was carried out when the room was cleared of furniture, enabling a more thorough examination. This, and careful observation during the subsequent treatment programme begun in 2019, revealed exciting and interesting details, information that evidenced how the silk had been used elsewhere prior to its current location, how skillfully it had been hung, and how the original pattern repeat was in fact longer [17].

Some of these details exceed the scope of this paper but are testament to how much conservators, through the act of conservation, can contribute to art historical research and thereby increase our understanding of past practice. During conservation the jib door in the north wall was opened to reveal previously hidden pencil marks on the door frame which

recorded the growing heights of various family members. Everyone could relate to this very personal and human activity, which added poignancy to the work.

Treatment

The stretched net was removed and surface cleaning was carried out using a museum vacuum on low suction with soft brushes and polyurethane sponges as at Castletown (Figure 6). In a few places the silk fabric had been pasted onto the wall with a form of animal glue. This had darkened, leaving some large stains that were reduced by using IMS and blotting paper.

Figure 6. Surface cleaning using a soft brush to lift the dust into the vacuum cleaner nozzle. Note the medallion with Pliny Doves, which distinguishes this design version from the original fabric known as Lampas 6528. © Gerda Koppatz

The previous silk infill fabric had been dyed pink to match the original background colour, but it was decided to replace this with colours that blended with the surrounding faded areas in an attempt to make the pattern design easier to read. The infill fabric was first fixed onto the wall behind using Beva®371 tape, again following experience at Castletown. In some areas the original silk was reduced to a thin, papery layer of brittle fibres. After removing the previous repair, the delicate remains of silk were heat sealed to an inserted dyed, adhesive coated, silk crèpeline support, using a spatula iron (Figure 7-8).


Figure 7 (left). The delicate operation of removing the previous adhered support without losing fragments of silk © Gerda Koppatz.
Figure 8 (right). On site adaptations: to insert larger infill and support patches safely, the fabric was secured onto a board, which could be slid behind the wall covering. © May Berkouwer

The condition of each area dictated the precise combination of treatment selected. The challenge lay in configuring techniques normally performed in a well-lit studio environment to on site work with limited lighting and watched over by inquisitive visitors asking lots of questions!

The final stage of treatment was to apply a new protective layer of net over the whole silk. The most damaged wall sections were those on the north wall nearest the window, the entire east wall and the jib door on the south wall. The basic infill and adhesive treatments were not enough to secure all areas of weakness, and for this reason an adhesive coated nylon conservation net was applied in order to offer more substantial support.

Preparation of materials was carried out in the studio and once onsite, following the methods developed at Castletown, the prepared adhesive net was cut to size and raised into position. One conservator stood on top of the scaffold, while the other guided from below. The net was gently hand pressed into position over the whole surface, before heat-sealing using an iron on a very low setting. Edges were trimmed back to neaten (Figure 9).

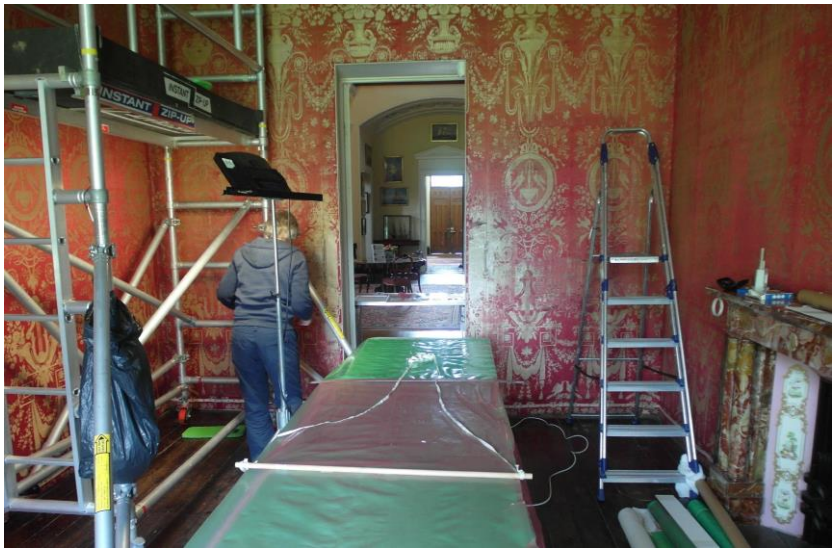

Figure 9. Working on site in confined spaces: The adhesive net overlay here 'relaxing' on the table in advance of its application onto the east wall seen ahead. The main entrance to the property is visible through the doorway © May Berkouwer

While the east wall (entrance) was fully covered with adhesive net, the north and south walls were only partially treated in this way and these two walls in their entirety were given the added protection of stretched conservation net (Figure 10). The loose net was pinned in place under tension and stitched along the edges using a curved needle. This involved much crawling around and working in uncomfortable positions, but conservators never give up!

Figure 10. Installing a final layer of protective conservation net, dyed to match the pink silk. © Ksynia Marko

Conclusions

The success of these two related onsite projects was based on sound research, a respect for design concepts and craftsmanship in the making and installation of historic wall coverings, clear communication and discussion when weighing up risk factors, careful experimentation and adaptation of techniques to suit the various problems encountered, and adherence to safe working practice. The interest and appreciation shown by visitors and staff was encouraging and information was supplied in bulletins and reports, updated as work progressed.

Notes

[1] **Moore, C.** (2017) The Conservation of the Red Drawing Room in *The Journal of the Irish Georgian Society* –Volume XX, 2017, pp108-123.
[2] Both the Red and Green Drawing Rooms were radically altered by Thomas Conolly (1738 – 1803) and his wife Lady Louisa between 1764 and 1768. Ibid.
[3] **Depner, D.** (2018) The Red Drawing Room Conservation Project at Castletown House, in *Heritage Ireland,* Issue 7, pp24-26.
[4] Statement from Castletown Guide Book.
[5] Beva®371 (Berger Ethylene Vinyl Acetate 371) created specifically for conservation applications. A first aid treatment to prevent loss carried out in 2005.
[6] **Hickey, G**. (2018) Castletown House's newly conserved drawing room is a seductive triumph, in *'The Irish Sunday Times, 19 August 2018 pp20-21'.*
[7] Unpublished report by Richard Humphries, Humphries Weaving, Sudbury, Suffolk. Analysis commissioned to determine the nature and quality of the 1870's silk at Castletown, as well as options for possible replication.
[8] Annabel Westman is an independent textile historian and consultant and is the Executive Director of The Attingham Trust. She was appointed a Fellow of the Society of Antiquaries in 1997.
[9] David Faulkner Interiors, Dublin
[10] **Martin, P.** (2016) Unpublished National Trust Internal Research and Vision Report.
[11] Memorandum to Dudley Dodd from J.E. Brunner 3rd August 1979 re - Over visiting.
[12] The removal of architectural decorative fittings revealed areas of unfaded silk, the colours indicating a greater complexity of weave and pattern.
[13] James Lees-Milne National Trust Wansdyke archive file 126.08. *'The drawing room in three sections along the south front and the little boudoir facing west are of architectural interest. The last with its slightly coved ceiling and walls lined with red Spitalfields silk is a charming and elegant specimen of early nineteenth century taste in decoration.'*
[14] A two-inch square loose fragment of silk was used for weave analysis that confirmed the Arlington version was hand woven on a draw loom. Jones, N. (2019) Unpublished weave analysis report compiled for and on behalf of Humphries Weaving and the National Trust.
[15] **Cornforth, J.** (1981) Arlington Court – Devon, in *Country Life*. 30 April 1981 pp1180-1181.
[16] Sketch plan drawn up in 1991 by James Bellchambers when reviewing the repair of architectural features.
[17] Sir John Chichester (1794-1851) married Caroline Thistlethwayte in August 1838.

Interior decoration of the house was undertaken at this time, possibly specifically for their wedding. A printed list or inventory with the date 1830, was found lining the timber walls behind the silk to the left of the fireplace.
Pencil lines, vertical and horizontal fold lines, tack holes, small areas of darning repair and patterns of soiling all indicated a former use. The silk would have been expensive and its specific design and reuse in the 1830's would have made sense.
The twenty drops of fabric are precisely joined with hand stitching so that the design repeats exactly across each width. Pencil marks along the bottom of the wall indicate where the vertical seams were to be aligned.
The cut edge of the silk around the two jib doors and door frames was secured onto red silk ribbon tape by the finest over-sewing stitch in pink silk thread, approximately 20 stitches to the cm, 50 to the inch, thus successfully preventing any fraying and no visual interruption of the pattern.
The bottom of the fabric (hidden by the skirting) was finished with a continuous line of gold/yellow silk running across the base of the design, indicating the start and end point of the pattern repeat of each drop. This showed that the silk would have been approximately 20 cm longer at the top edge, giving a total repeat of some 384 cm.

Acknowledgements

The Castletown project was jointly funded by the OPW, Castletown Foundation and the Apollo Foundation. Enormous thanks are due to Dr Dorothea Depner, Project Manager, and Christopher Moore, Curator, for their trust and unfailing support throughout the project. Special thanks are due to Evelyn Francis, Castletown Conservation Assistant, for her hands-on practical help, which enabled the project to be completed in the time allowed, and to all the other staff at Castletown who made our stay so pleasurable.

Thanks to the National Trust, represented by Ana Chylak, General Manager, Arlington Court, Michele Bartlett, Regional Conservator and Paula Martin, House and Collections Manager who undertook valuable research which helped to establish the importance of the Boudoir silk and to conservators Gerda Koppatz, Annabel Wylie and Anna Peck who all assisted with phases of treatment on site at Arlington.

Technical details

Castletown Red Drawing Room

- Fabric: White and crimson figured silk, selvedge of white, crimson and pink vertical stripes, the fabric identified as being hand woven on a Jacquard loom. Each length joined with fine, hand-sewn backstitching in cream coloured silk thread, creating a flat pressed seam.
- Dye analysis carried out by Ina Vanden Berghe at KIK-IRPA revealed the crimson to be Mexican cochineal (*Dactylopius coccus* Costa) with a tannin mordant and the pink as soluble redwood (*Caesalpinia* sp).
- Fabric width: 52.5 – 53 cm (21") seam to seam.
- Pattern repeat: approximately 125 cm.

- East and west walls: main wall section - 363 cm H x 527 cm W approx.
  above the doors - 173 cm H x 187 cm W approx.
- South wall: 363 cm H x 930 cm W approx. with a central fireplace.
- A total of 46 drops of silk cover the east, west and south walls.
- North wall: Fabric at corners, either side of three windows and above two mirrors.

Arlington Boudoir

- Fabric: Silk damask woven on a draw loom, the dominant colour in the satin weave being pink with the design woven in white, cream and green (now faded). No dye analysis available to date.
- Fabric width: 58.5 - 61 cm (23 - 24")
- Pattern repeat: Approximately 364 cm plus approximately 20 cm of the design missing at the top.
- A total of 20 drops, totalling 72 metres of silk, cover the north, south and east walls with no fabric on the window (west) wall.

Online video of the Castletown project (last viewed 29.12.2020): https://www.youtube.com/watch?v=GHMZAfvCm_0

Online video of the Arlington Boudoir work: https://www.nationaltrust.org.uk/arlington-court-and-the-national-trust-carriage-museum/features/saving-our-silk

Materials and Suppliers

- Beva®371 Tape. Preservation Equipment Ltd., Tel: 01379 647400, info@preservationequipment.com
- Correx Board. Preservation Equipment Ltd., Tel: 01379 647400, info@preservationequipment.com
- Melinex®**.** Preservation Equipment Ltd., Tel: 01379 647400, info@preservationequipment.com
- Conservation Net. Dukeries Textiles & Fancy Goods Ltd., Tel: 0115 981 6330, dukeriestextiles@googlemail.com
- Polyurethane cosmetic sponges. Glocos, Tel: 01603 270701, info@glocos.co.uk
- Fuji Silk (no longer available). Whaleys (Bradford) Ltd., Tel: 01274 576718, info@whaleysltd.co.uk
- Lascaux 360 & 498. P Fitzpatrick, Tel: 020 7790 0884, info@apfitzpatrick.co.uk
- Industrial Methylated Spirits. SCI-LAB Supplies, Tel: 01787 472068, www.fisher.co.uk
- Silk Crèpeline. Sfate & Combier (France), Tel: 33 474922052, contact@sfate-et-combier.fr
- Stainless Steel Staples. Isaberg Rapid AB (Sweden), Tel: 46 370 33 95 00, www.isaberg-rapid.com

Note: Vinamul 3253 no longer available

Historical Wall Hangings in Castle d'Ursel: How to Care for Historical Textiles in an Event Space

Jefta Lammens, *Owner of Jefta Lammens Conservation, Textile & Wood conservation*

How to Implement Aftercare and Budgets as a Freelance Conservator

The Castle d'Ursel in Hingene, Belgium, was originally a summer residence of the Ursel family. It came in their possession in 1608 [1]. Through the years the castle underwent a series of extensions and alterations. Every generation also decorated and redecorated the rooms. During the years they collected several hand-painted and printed cotton textiles. A large number of them are from Indian and European sites. The oldest textiles date from the second half of the 17th century, the newest textiles from *circa* 1967 [2]. These textiles were mounted onto wooden frames and placed in the wainscoting. Through the whole castle the majority of the rooms were decorated with these textiles. The family left the castle in 1973 after it was sold [3].

After years of abandonment, the castle became the property of the province of Antwerp in 1996. By then it had already been neglected for years and the interior was almost in ruins [4]. The textiles were still there, but in a bad condition. A year after the castle switched owners, in 1997, the panels were removed, dusted off and packed for storage. Some of the frames were dismantled because of a fungus infection. In 2009-2010 they were wet cleaned and stored again [5]. During these years of storage, the rest of the interior was fully restored. In the meantime, the empty spaces in the wainscoting were filled with white fabric. In 2015 the conservation project of the 82 panels and smaller fragments officially started.

The panels consist of a soft wood frame, covered with a coarse linen fabric. This was glued with paper onto which the decorative fabric came. The textile was mostly nailed on the sides of the frames. Some had additional stitching. A part of the panels were covered with one kind of fabric. Others had decorative bands around a central field.

The goal of the conservation project was to preserve the panels as they were constructed as far as possible. They were to be reinstalled in their original space in the castle.

The biggest issue were the large missing parts in the fabric in about 30 of the panels (Figure 1). Some panels were torn open during the restoration of the building to inspect the wall behind. In this early stage of restoration the textiles were not recognized as being important. Others were probably vandalized or gone missing during the years.

Figure 1. Panel 4.2T2 before treatment © Jefta Lammens

These lacunas needed to be filled in. Since the textiles were printed in bold patterns and colours, a neutral infill would not have worked. It was decided to reprint the missing parts on fabric. High resolution photos were specially made and used to digitally restore the image. These were then printed on a similar cotton fabric. This was done by House of U, a company that prints fabrics for the fashion industry and could print in very high resolution (Figure 2-3).

Figure 2. Panel 4.2T2 with printed infill © Jefta Lammens

Figure 3. Panel 4.2T2 after treatment in daylight © Jefta Lammens

After the Conservation

The castle is now owned by the province of Antwerp and has multiple functions. It hosts cultural activities such as concerts, catered events and exhibitions. Every other year there is a big exhibition that relates an aspect of the history of the castle with contemporary arts. Also smaller exhibitions about a particular aspect of the history are organized. Furthermore the castle publishes a magazine that appears three times a year.

The biggest challenge now is to combine this collection of fragile textiles with the daily activities. The castle has no designated museological areas and there are no conservation staff on site. Some textile decorated rooms are being used as office space. The management does have an understanding of caring for an historic interior.

Most of the events are limited to the ground floor rooms where there are no textile panels. The historic Chinese wallpaper is protected by a distance alarm. There are also strict rules about where catered activities can take place. Once a year Monumentenwacht Vlaanderen, a heritage inspection service of the Flemish government, does a thorough condition check of the interior. This does not include the textiles for now.

Despite this there are still some aspects that ask for a specialist or simply more time. The castle only has a small staff of seven people, of which most only work part-time. They are responsible for maintenance, organization, PR and accountancy. No-one is specifically trained to deal with collection care or climate control. The climate and pest management became my responsibility somewhere during the project.

The integrated pest management at the moment consists of regularly examining the insect traps. During the conservation project this was easy to follow up. Where there was suspicious activity, actions could be taken on short term. Since my presence is decreasing this needs to be more planned in, or taken over by someone from the staff. So far this proved to be beyond the skills of the maintenance staff, struggling to identify the bugs.

In a number of rooms data loggers were placed that log the climate. They are linked in an online program that registers the readings and sends out a warning when certain values are exceeded. Last year this program was implemented in the intranet of the Province. Sadly the intranet can not be opened on an Apple device. This makes it impossible for me to check the charts from a distance and take action when needed. The question here again is who can take over the monitoring and can take the actions needed.

So far the monitoring is a passive system. Simple things such as not opening the windows when it rains needed to be pointed out a couple of times. One of the textile decorated rooms is an office space and the window is sometimes opened when it gets too stuffy inside. It is sometimes difficult to combine the comfort of the people with the care of the fragile textiles.

Actions

For the daily maintenance some general guidelines will be installed for the pest and climate management. The polyvalent maintenance staff is already asked to look for signs of pests. They have an overview with photos of what to look for. Despite being very cooperative to look out, it is clear that they will need more support and information. When it is possible again, a more elaborate course on pest management should be organized.

During the Covid-19 period the staff mainly worked from home, including the maintenance staff. Because of the reduced activity the rooms were less vacuumed. This resulted in a small outbreak of carpet beetles that apparently infested the modern carpets. This was detected in the insect traps and the carpets were disinfected by an external company. This shows that having a trained staff member on site is essential to avoid these kind of problems. Being able to take actions in a short time prevented the textile collection being in danger of becoming infected as well. Because the panels will be inserted in the wall this is even more important, since only the front will be visible for inspection.

Despite the following up of the pest and climate management not being a part of the project, it is clear that a protocol will have to be installed. Because of Covid-19 there has not been time yet to start the dialogue. It will have to be considered if a member of the staff can be trained to take up a number of these tasks. Or if there is a budget to allow for periodical check ups.

Exhibitions

For the bigger exhibitions a set of general guidelines will have to be outlined. The size of the rooms do not allow very big groups of people. The design of the exhibition will need to take this into account. The displays and works of art will have to be installed in a way that invites people to move around the room without wanting to form big groups. A distance alarm is not an option as this would further decrease the space.

There are hanging rails for paintings in most of the rooms. The problem thus far has been that the paintings tilt and the bottom of the frame rests on the textile. For now pieces of soft foam or felt were placed between the textile and frame. Where the original textiles hang a new hanging system will need to be found. In the last exhibition the paintings were displayed on an easel. Not every exhibition design can incorporate this, but it was certainly a good solution (Figure 4).

Figure 4. Display of a painting in front of the panels in room 4.2. The painting was placed on an easel in the alcove © Joris Ceupen [6]

A permanent LED light system will be installed to prevent having to change the lights for every installation. Another issue with light is that the newly printed infills change colour in some light. The colours were chosen in daylight, so the new LED lights should be in the same spectrum (Figure 5).

Figure 5. Panel 4.2T2 after treatment in artificial light. Notice how the infill that was not visible in daylight takes on another colour hue and stands out © Jefta Lammens

A budget for UV filters on the windows is the next item on the agenda. Because of the nature of the organization these investments will have to be spread and accounted for in the budget. This will have to be discussed with the management.

The exhibition 'Print & Paint, 350 years of flowers on cotton' was planned to open in May 2020. Because of the Covid-19 this was postponed to 2021. During the conservation project I was included in the curating meetings. This was a unique opportunity to make sure the safety of the textiles could be combined with the exhibition design. The postponing can be used to refine this.

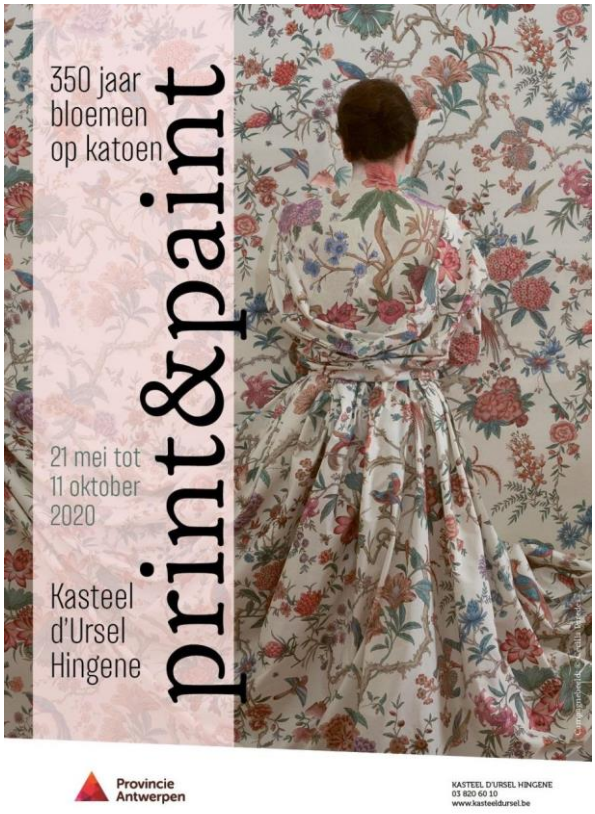

Figure 6. Leaflet of the upcoming exhibition, PRINT & PAINT, 350 jaar bloemen op textiel - PRINT & PAINT, 350 years of Flowers on Cotton. Originally planned for May 2020, now postponed to 2021

To conclude

A hands on conservation project such as this is always followed by a lifetime of management. In the context of a building that is not a museum nor trained staff, a different approach is clearly needed. There is of course a number of publications available on the subject, but the practical implementation is another thing. The budget of the treatment project did not include the aftercare.

A freelance conservator can provide information and include an aftercare addendum in the conservation report. But a thorough and made to measure collection care plan takes more than that. The aftercare will take some meetings with the management, who are very willing to invest, but have of course a budget to take into consideration.

Notes

[1] **Bungeneers J, De Vlieger-De Wilde K**. 2012. Zomers in Hingene. Het kasteel d'Ursel en zijn bewoners. Leuven: Davidsfonds Uitgeverij nv

[2] Idem

[3] Idem

[4] Hingene - Kasteel d'Ursel - Masterpla, textilia. Unpublished document

[5] Idem

[6] https://www.flickr.com/photos/121668384@N04/37141681573/sizes/l/ . Accessed 18 December 2020

TAPESTRIES, BOOKS & LIBRARIES

Session Three

Looking Back, Looking Forward, Looking in from the Outside. Opening Up Doors to Outsider and Insider Views on Tapestry Conservation at the KIK-IRPA

Griet Kockelkoren, *Head of the Conservation Studio of Historical and Contemporary Textiles, Costumes and Accessories in the Royal Institute for Cultural Heritage (KIK-IRPA), Brussels*
Michelle De Brueker, *former Textile Conservator at Royal Institute for Cultural Heritage (KIK-IRPA), Brussels*
Emma Damen, *former Textile Conservator at Royal Institute for Cultural Heritage (KIK-IRPA), Brussels*
Wies Stortelder, *Textile Conservator at Royal Institute for Cultural Heritage (KIK-IRPA), Brussels*

In the year 1987, Nobuko Kaijtani wrote in her article 'Conservation Maintenance of Tapestries at The Metropolitan Museum of Art' [1], 'this article along with three previously published papers presents the testament we leave to be evaluated by our successors'.

This article reflects on how the team of the KIK-IRPA [2] in Brussels went about unravelling and capturing the ideas and considerations concerning tapestry conservation by their predecessors. The question "Do we really know where we came from?" was a starting point to help define where the team wanted to go in the future. By seeking to understand decision making of the past, they hope to avoid going backwards or ruminating on the same issues. Did this project help? In short, the answer is yes.

In the same article Kaijtani describes not only the methods, but also the new materials she introduced in the conservation of tapestries and the thought process behind why these materials are chosen. She concludes that 'the functional longevity of these conservation materials cannot be properly evaluated until the years 2020 to 2045'. So here we are, 34 years later, right on track to begin looking back into the past to assess how to proceed for the future and why.

Figure 1 (left). Image nr n006786, two textile conservators working together on the lining of a tapestry, 1980's ©KIK-IRPA

Figure 2 (right). Image nr m134134, the textile conservation team of the KIK-IRPA–, 1979 ©KIK-IRPA

Looking back into the history of the KIK-IRPA's conservation studio

In another paper published in the context of the same 1987 conference [3], former KIK-IRPA colleagues wrote *'The Institut Royal'* has engaged in the treatment of tapestries for more than fifteen years. This means that the foundation of the conservation of tapestries in the KIK-IRPA in Brussels can be set before 1972 (Figure1-2).

In the MET and also in Brussels we find testimony of a shift in the kind of treatment and materials used for the conservation of tapestries. The KIK-IRPA's article states for example that 'At the beginning we followed the classical reweaving procedure, but since then we have gradually evolved towards an approach of pure conservation'. With this our colleagues mean that they abandoned reweaving because as they continued writing 'in doing so, we were compelled to fill in missing details from our imaginations, which goes against the grain of respect for the authenticity of the work of art.' We later learned that concerns about 'tension on' and 'penetration of' the original material also played an important role in this discussion. They made a switch from reweaving to 'consolidation by sewing the tapestry on fine linen linings dyed to blend with the surrounding composition'. A method that is still the basic principle applied today.

These kinds of articles are very useful because they affect the heritage of the KIK-IRPA directly. In addition to articles, there are conservation reports on every object ever treated in the studio; reports that can be consulted in the KIK-IRPA's archives at any time. The treatments, materials and methods are often very well described, but the reflections for the decision-making are not always so clearly mentioned. Articles like these help to complete this part of the puzzle.

Reading the above mentioned articles and listening to the stories of former colleagues, as well as seeing the results of conservation treatments performed during the 1970's and 80's, not only in Belgium and the US, but also amongst others in the Netherlands and the UK, it must have been buzzing and exciting times in the world of textile conservation and the people that re-shaped it. New insights were gained, exchange between many professionals in the field was going on with studio visits and otherwise. New materials and methods were tested, introduced and discussed. Textile conservators looked at other conservation disciplines.

Even though the nature of conservation practice is constantly changing, it certainly seems that the foundation of our current visions, methods and approaches seem to have been formed then and there [4].

Figure 3. Image nr km000215I, Michelle De Brueker in 1994 at the KIK-IRPA Textile Conservation Studio, mapping every conservation stitch she makes whilst conserving a tapestry on a conservation loom. We no longer map every stitch; currently we make a more global schematic overview of the stitches and specific areas of treatment. But these mappings are testimony of how well thought out every step was and it is very interesting to go back to the old conservation files to review them ©KIK-IRPA

In the textiles conservation studio at the KIK-IRPA, all current staff members received part of their training, especially on tapestry conservation, in-house by our precursors. Knowledge is passed directly from the conservators who did the research and created this mentioned shift in conservation approach (Figure 3). This also means that currently there is a shared vision for tapestry conservation and all have been taught using only the very latest results and conservation methods that were derived from former research and 'trial and error'.

With the retirement of Michelle De Brueker [5], the youngest member of this long-standing, but always dynamic, open minded and visionary team, we realised that with her departure we are at risk of losing much more than just a valued member of our current team. To us, she also embodies in a way the memory of our conservation studio and all that goes with it.

So, how to safeguard even a fraction of this knowledge, insights and experience?

This is not only the leading question behind this article, but is a common thread that also lives in many other conservation studios around the world [6]. In the light of this question we could have focused on multiple objects or topics that have a link with the history of our conservation studio. But we decided to focus on the conservation of tapestries for multiple reasons. Not only are they so interwoven with the origin of this conservation studio, but a huge amount of research, especially in the earlier years, was dedicated to the development of current conservation methodology and the choice of materials for their treatment.

Lots of experience was built up and very specific visions about these treatments were formed by our colleagues who worked in the studio from early on. Less tapestries come to the studio now, partly due to economic reasons and partly due to staff reduction. Currently only a few independent conservators in Belgium offer tapestry conservation; they are mostly of an older generation and succession is 'not yet' guaranteed. It is also very difficult to incorporate tapestry conservation in a formal training environment such as a university, mainly due to the size of these objects.

Taking all these reasons into account, we feel it is one of the main aims of our studio to keep on safeguarding and spreading this knowledge, as well as the practical conservation skills needed.

Finding a Way to Safeguard the Knowledge of Our Predecessors

Once the decision was taken to safeguard this knowledge, and which aspects were to be focused on, the next challenge was to find a way of doing so. The way we currently work in the studio is very different than before. Not only has the number of conservators in the studio changed, also the time that can be spent on the research and treatment of one object and the current economic environment that were of little issue in the past, increasingly need to be accounted for. At the moment, most work is assignment-focused, which often entails very interesting and unexpected questions and objects, but this makes it more challenging to determine personal, targeted research in the short term.

Therefore, in order to be able to spend the time we needed to learn from this generation through practice, debate and visits, we needed to create a well-defined project. This was not only necessary to oblige ourselves to dedicate our focus and time, but also to get the support of our management so we, as KIK-IRPA, would be able to do this.

It is key to mention here that without the enthusiasm and dedication of Michelle, it would have been useless to start this project. This enthusiasm and passion to share knowledge helped tremendously not only to 'sell' the project to management and stakeholders, but also to make the project such a unique experience; so valuable and profound for us. All these elements were indispensable to make the project work.

Our federal sister institution 'The Art and History Museum' [7], was a crucial partner [8] in the development of our conservation studio and methodology since the very beginning of its foundation. Many of the key objects that helped shape the thinking process and practice of the way we worked in the studio, originated from their collection and from debate with their collection's curators.

Because active conservation cannot solely be taught in theory, we knocked on their door once again and found an enthusiastic and generous partner and with this, the perfect tapestry to embed the crucial hands-on conservation practice in our project. The tapestry chosen together was not too big and had a lot of interesting conservation challenges that would open up debate, but was not too complex conservation-wise either (Figure 4).

Figure 4. Image nr x143761, Aubusson tapestry 'The Birdcage from the Chinese series' dated AD 1750-1800. The Arts and History Museum collection © KIK-IRPA

As previously mentioned, in our studio we are all trained in the same way and vision. Because of this, we knew that it would be very interesting to get an *outsider's* point of view. We hoped they would ask the questions and start debates of things that we would not because they might appear too evident to us or on the other hand because they might be too far apart from our current practice and ethics [9].

We were lucky to get applications [10] from textile conservators [11] from all over the world. To be able to exchange our thoughts and experiences out in the open and mirror them to the outside views of colleagues with such different experiences proved extremely valuable in more than one way.

The Practice of Exchanging Knowledge and Opening Our Minds to Different Perspectives

Within the project, a four-week program was developed to take participants through all the steps in the KIK-IRPA conservation process [12]. It started with a studio presentation to show what has been done and what they can expect. It was directly followed with a presentation from the participant to introduce us to the conservation methods and materials they are familiar with from their own experience elsewhere in the world. Then we dove straight into hands-on conservation work on the tapestry.

Thanks to these presentations, we were all familiarised with certain aspects of the work and could recognize the differences in practical methods while we were working on the object.

This opened up constant dynamic debate and knowledge exchange in both directions from the very beginning [13].

The tapestry was divided into zones in such a way that every participant would face all the challenges and different steps in the conservation process we wanted to present to them. We could only put those steps into real-life practice whilst the tapestry was on the loom. Therefore PowerPoints and some small dummies were prepared to show the steps that we couldn't undertake together on the tapestry itself.

In this article only small practical details of the method applied will be mentioned. We will not unravel the entire step-by-step method, since it is already described in other articles [14].

Figure 5. Review and discussion of the executed conservation stitching, seen from underneath the conservation loom, on the backside of the tapestry © KIK-IRPA, 2020

Not only the differences in conservation practices were mapped out during the project, so were all the discussed topics of debate and reflection [15]. The discussions and debates went from the seemingly smallest of things, but also these small things could have quite a big impact (Figure 5).

One of those was the debate about the question of 'knot or not to knot'. Whilst our tapestry is on the conservation loom, we usually add different strips of fine linen lining for consolidation that is attached by hand sewing methods. In the end, the linen fabric will cover and reinforce the entire backside of the tapestry. Every stitch is carefully placed in order to reinforce, but not cause tension, amongst others keeping in mind the weight distribution of the tapestry and the physical forces at play once it is hung again.

Therefore at the beginning of a new sewing thread we usually did not attach the sewing threads by backstitching, but we just made a little knot that prevented pulling the thread too far. Nevertheless, we pulled the knot not tight, but pretty close to the tapestry.

Debating about this did result in a change in our method. Now, we still do the knot, but leave about 1 cm of thread in between the knot and the tapestry to allow even more movement.

We debated about knots, hanging systems, synthetic threads versus natural fibers, linen support fabrics versus cotton, how much material loss is acceptable during treatment and cleaning, how and when to close the slits, how and when to add the strips of lining, and so on. Sometimes it forced us to rephrase our methods for a full understanding and to challenge ourselves to explain why we would choose a certain element, material or stitch rather than another. This is very well symbolised in the 'to knot or not to knot' discussion. A consensus was not needed in these discussions nor was it our main goal. Simply mirroring these differences in practice and in thinking-processes was enriching for us all.

We also realised that we have a lot of trust in our professors. Maybe even too much? Their visions and insight shaped our own visions quite strongly and it is good to take a step back and look with an open mind at other possible points of view and at other approaches.

Despite the fact that the world has become so small and information is so well spread and shared, somehow it seems that we still mostly end up finding colleagues that share more or less a similar vision. In all the sources we find that terminology can be a dangerous thing to rely on when possibilities coming from different viewpoints are not taken into account. This can also be confusing terminology once we come across what we might call the vision of 'another school'. For example, it became apparent that in the KIK-IRPA we interpret the term minimal intervention quite differently at certain stages of the conservation treatment than our colleagues from the Met [16].

The context we work in and the future 'use' of the tapestries we want to preserve, seem to play a substantial role in the decision making for the conservation approach [17]. The tapestries that come to the KIK-IRPA usually are in ownership of a museum, church or sometimes a private owner. But very few have designated places where they would be on permanent display. So how they will be used in the future, stored or preserved is often a much unknown factor. This is one of the reasons why in KIK-IRPA we always aim in our conservation treatments for maximum reversibility of everything we add. In the UK for example, often tapestries are hung in the same place where they have been for centuries and they will not only remain there but also receive regular monitoring by trained conservators. This seems to translate into a greater focus on re-treatability where the possibility to continue building on existing conservation treatments is taken into account in the process.

Working on a tapestry involves teamwork. The team that started KIK-IRPA's conservation studio was overall young, they had no other formal conservation or restoration training and they had the opportunity to shape their mind, vision and methods together. Forty years later we started this journey again with an open mind. Changing things, like the previously mentioned 'knot' for example, was not hard because we all lived through the same reflections. But when one works in a team that has long standing traditions and habits, it can be very hard to introduce change, even when new insights are gained and even when the 'why' of certain working methods are not so clear anymore.

On the other hand, decisions from the past also play a role for the possibilities of treatment for the future. Since the reweaving was pretty much completely abandoned many decades ago by our predecessors in the KIK-IRPA [18], we simply do not have the skillset anymore to do it. We understand and still stand by their decision, but if there would be a case in the future where we would want to apply it, this knowledge is lost in our studio and we would need to search for this skill set elsewhere.

New challenges will always be ahead. During this project the reweaving done in the past was examined. Through exchange with Mieke Albers from the Rijksmuseum in Amsterdam, who did a study on the common current problem of tapestry that has discoloration of zones that were rewoven in the past, we were very happy to share her experience on this and learn about her research and solution of recoloring of these areas [19].

A final thought that was very much stressed by Michelle is that for tapestry conservation we need to be methodological in our approach, but apply this very consciously in the execution, because we want to keep on re-thinking and adapting every step to the real needs of every area of the tapestry.

Despite some differences in approach and points of view, it can be concluded that every participant's approach to the conservation of tapestries is based on the same basic aim, namely to maintain and preserve the object and its material biography in a durable way for the future. We just have different ways to get there.

What About the Condition of Objects Treated in the Past?

We did not only look at the future by learning from the past from within our studio. Throughout the project many visits were made to interesting tapestry-locations in Belgium and a lot was learned about the development and evolution of the conservation methods by looking at the objects that were conserved in different ways in the past.

One visit, by all can be seen in the picture below. It shows Michelle giving a tour in the Art & History Museum in Brussels. The tapestry that is discussed here is the one that irreversibly carries in its material biography the shift and evolution of KIK-IRPA's textile conservation studio as is mentioned in the beginning of this article (Figure 6-7).

Figure 6 (left). Visit to the Art & History Museum in Brussels, 2020 ©KIK-IRPA
Figure 7 (right). Visit to the Art & History Museum in Brussels, 2019 © KIK-IRPA

As we look at the future, we not only aspire to continue this project, but we also have many other related projects in mind for which we hope to find the much needed and priceless time. If we take one lesson with us from this project, it is that despite the current economic situation we need to find a new way to continue to challenge and open up our minds and make time for reflection, debate and to be inspired by other colleagues, for the benefit of the future of our heritage (Figure 8).

Figure 8. Visit to the Art & History Museum in Brussels, 2020 ©KIK-IRPA

Acknowledgements

We want to thank everyone involved for their interest in this project and for their enthusiasm and support on so many levels.

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A big thank you also goes to the Art & History Museum in Brussels for playing a significant role as well, because they made it possible for putting the KIK-IRPA's approach into practice through the conservation of a well-chosen tapestry from their collection".

The significance of the work on tapestry conservation of many previous and current colleagues, but especially the former studio heads Juliette De Boeck, Vera Vereecken and Fanny Van Cleven, cannot be underestimated. The same must be said about the indispensable support, related work and research of Liliane Masschelein-Kleiner, former director of the KIK-IRPA.

We are very appreciative to the Icon Textile Group for giving us the opportunity to share this experience with other colleagues.

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And last but not least, thank you to all the participants of our project for your generous participation, discussion, open-mindedness, support and enthusiasm. We very much look forward to the future and to the second phase of this project that only became more enriching and more valuable thanks to you.

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Investigating Tapestry Conservation and Display with Digital Image Correlation

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Introduction

A long-term research project in the UK, initially based at the University of Southampton and then at the University of Glasgow, has investigated physical aspects of tapestry degradation and conservation. Initial investigation by the Textile Conservation Centre and the School of Engineering at Southampton considered the techniques used by engineers to monitor structures, to see if they could be useful for assessing the condition of tapestries (Dulieu-Barton *et al.* 2005). This pilot study indicated that three-dimensional digital image correlation (3D DIC) would be a useful technique, and this was trialled in a three-year project funded by the UK Arts and Humanities Research Council[1].

3D DIC is a non-contact monitoring method which takes simultaneous images with two cameras to provide information on out-of-plane deformation. It then compares successive pairs of images over time to measure displacement within the tapestry. The computer software translates this into strain, a measure of percentage deformation (the change in length compared with the original length). We thought it is fair to assume that, in a historic tapestry, damage is likely to happen first in areas of relatively high localised strain. The project demonstrated that DIC gives both quantitative and qualitative information – it also creates strain maps - though at that point we could only record data from a small area. Further information on the project methods and outcomes can be found at Lennard *et al*. (2011) and Lennard and Dulieu-Barton (2014), and on the project website at http://www.tapestry-strain.org.uk/.

More recently the DIC technique has been employed as a tool to investigate the conservation treatment of tapestries in a new project funded by the Leverhulme Trust, a collaboration between the Centre for Textile Conservation and Technical Art History (CTCTAH) and the School of Engineering at the University of Glasgow[2]. This allowed us to use the strain monitoring methodology to examine conservation stitching techniques and display methods, particularly the use of slanted supports. This paper reports on the more recent work in Glasgow.

DIC Set Up

Before implementing the DIC as our monitoring technique, we needed to be sure that we could trust the results it gives us. The complex structure of tapestry presents a challenge when interpreting its behaviour: tapestries are heterogeneous, meaning they don't have the same properties throughout. They are made of various materials, the weave structure is discontinuous, and the warp and weft yarns have different properties, with the warp yarns being more tightly twisted. Material degradation over centuries and previous treatments also contribute to the complexity of the structure.

DIC works by breaking the overall image down into small areas or subsets – a subset is a group of pixels. As the tapestry stretches and deforms, the DIC algorithm compares the position of each of these subsets from the first reference image to the subsequent images taken over time. To do this successfully each subset has to be unique and identifiable so that the camera can recognise it after it has moved. This is usually achieved by applying a random speckle pattern to the substrate to be monitored, helping the cameras to register and track displacement. We obviously cannot do this with a historic tapestry so the project's researchers, Dr Jafar Alsayednoor and Dr Kenneth Nwanoro, looked at whether the tapestry design itself can be used in lieu of a speckle pattern.

The researchers found that some features can cause problems, especially where the colour changes abruptly from light to dark, and in large areas of similar coloured yarn. A computational tool designed to assess the error in DIC strain measurements for a given tapestry image under arbitrary applied strain fields was developed by the researchers to better evaluate the use of DIC for a given tapestry (Alsayednoor *et al.* 2019).

Another challenge is determining the appropriate subset size for a tapestry. The DIC averages strain information across the subset – if it averages across too large an area, spikes in the data are smoothed out and information is lost. The average figure is more accurate with a smaller subset size, but if this is too small, there is a risk that the subsets all become too similar to each other and then the DIC has difficulty correlating the images. Finding a balance is critical in obtaining good strain information and this might be different for different tapestries (Alsayednoor *et al*. 2019).

The 3D DIC system combines images from two cameras but the project also investigated the use of 2D DIC with a single camera for strain monitoring. It is more straightforward to use one camera, which can be sited in a historic building more discreetly than a dual camera system and is much less expensive. A long-term trial using one camera to monitor a newly woven Unicorn tapestry at Stirling Castle (with Historic Environment Scotland) demonstrated that monitoring can be successful if the tapestry hangs flat against a wall and movement is minimal. But we have found that accurate strain data can only be obtained from one camera if the tapestry is flat. If the surface is undulating, as in many historic tapestries, it is necessary to use two cameras in a 3D system to register the out of plane deformation and calculate the strain (Alsayednoor *et al.* 2017).

Trial Strain Monitoring of Historic Tapestry

Costantini tested the DIC monitoring technique on a fragment of historic tapestry measuring 1600mm high x 400mm wide (Costantini et al.2020). The fragment, from the Karen Finch Reference Collection at the CTCTAH, was in weak condition with several open slits. It was suspended from a vertical board to prevent out of plane movement and monitored for 200 hours with a single camera. Strain data were calculated to provide both the average strain across the whole fragment – the global strain – and the local strains in the area of the slits; both evolved over the course of the trial. The maximum global strain, in the longitudinal direction, was around 0.2%. The slits gradually opened over the 200 hours and these areas showed as red areas of high strain on the strain map (Figure 1). It is important to note, however, that the software interpolates strain calculations across small holes in the tapestry

(there is no material strain where there is no fabric) so these were denoted as areas of pseudo-strain. Nonetheless, the strain map gives a clear picture of areas of concern to a conservator.

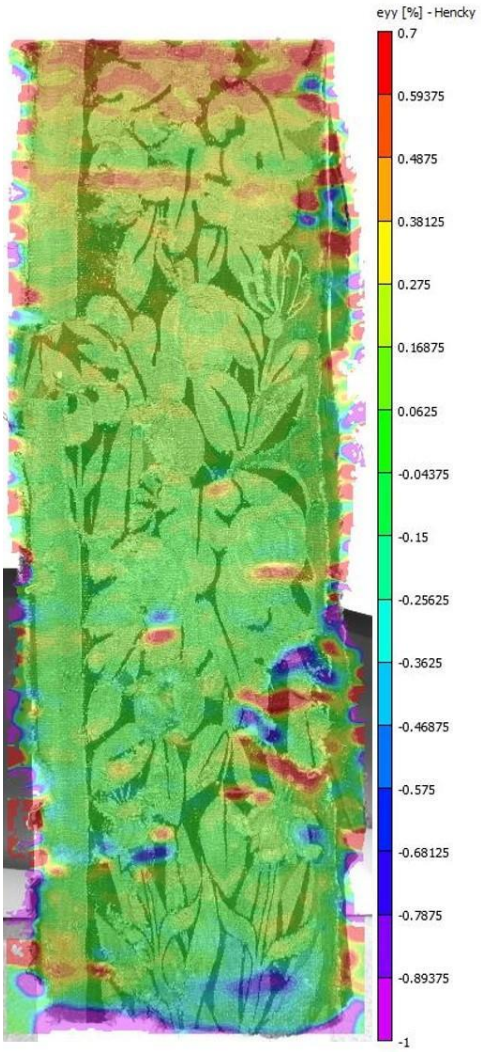

Figure 1. Strain map of the tapestry fragment after 200 hours of monitoring. The red areas show where slits and other weak areas opened up. The DIC cannot measure strain across holes, where there is no fabric, so these areas were interpreted as areas of 'pseudo-strain' © University of Glasgow

As it was not possible to carry out tests in a controlled environment, the relative humidity (RH) fluctuated over the course of the test. There was an extremely strong correlation between RH and strain data as had been demonstrated during the Southampton project. This is believed to be caused primarily by an increase in moisture absorption with rising RH, leading to an increase in weight of the tapestry. However, the mechanism is complex, and the swelling of fibres also plays a role; global strains (strain calculations averaged across the entire measurement area) in the horizontal direction were also correlated with RH but to a lesser extent. This correlation gave additional confidence in the results, showing us that we could trust the globally averaged DIC strain data.

This test confirmed University of Southampton results demonstrating that fatigue - repeated expansion and compression caused by fluctuating RH - is likely to be an influential mechanism causing damage to tapestries in the long term, a significant factor if the environment is not able to be controlled. However, creep, or permanent deformation, is also likely to occur, particularly in damaged areas, and in the weeks after the tapestry is first hung (Costantini *et al*. 2020). Having carried out these tests, we were confident that the 2D DIC was giving us accurate results, and on larger areas of a tapestry than previously achieved.

3D DIC was also trialled by the project team to monitor a complete tapestry, before and after conservation treatment, in collaboration with the textile conservators at the Burrell Collection, Glasgow Museums. However it was apparent that direct comparisons could not be made between the strain maps from before and after treatment; these were effectively two different tests, and any changes in strain shown could have been attributed to different hanging conditions, rather than to changes in condition relating to conservation.

Display of Tapestry on a Slanted Support

The display of tapestry on a slanted support has become more common in recent decades, particularly in mainland Europe, following the practice of the textile conservator, André Brutillot (Wild and Brutillot 2006). Tapestries are often displayed at an angle of 5° from the vertical, with a textured fabric covering the board to increase friction between the board and the tapestry. Our research set out to investigate the contribution of these two factors: the angle and the board covering.

As previously demonstrated by Barker (2002), it is simple to calculate the reduction in strain caused by increasing the angle of support and lessening the effect of gravity, though her article did not include the influence of friction between the tapestry and the supporting board. Costantini *et al*. (2020) extended the analysis to include the influence of friction. If there is little friction between the support and the tapestry, as on an uncovered board, it can be demonstrated that there is a negligible decrease in load when the angle of the support is reduced from vertical to 5° from the vertical. As the angle increases to 45°, the reduction in load is more significant, around 30%. But increasing friction between the support and the tapestry has a considerable impact; with a high coefficient of friction of 1.5, there is a reduction in load of around 15% with a display angle of 5°. Next trials were conducted using new wool rep fabric[3], suspended at different angles against a solid board. 2D DIC was used to record the reduction in strain caused by increasing the angle of support.

Further tests were carried out to compare the friction between small tapestry fragments and a range of fabrics commonly used to cover slanted supports: cotton domette, cotton molton (or molleton, a domette-style fabric used in mainland Europe), polyester felt and cotton velvet (reported in Lennard *et al*. 2020).

Friction tests were conducted using a simple inclined plane method. A board was covered with the fabric and the tapestry fragment placed on it, then the board was slowly raised from horizontal until the tapestry began to slip, measuring the inclination with a smartphone app, Multi Clinometer. It was found that, with all fabrics, the friction was so

great that the board could be raised from horizontal to vertical, and then tilted beyond vertical, so that the tapestry fragment was beginning to face the floor (around 100° from horizontal) before the tapestry began to slip. This made it impossible to calculate a value for the coefficient of friction, and it was apparent that the simple Coulomb model of friction does not apply in these cases. It is clear that additional forces are having an effect; it appears that mechanical interlocking between the fibres of the tapestry and the fabric covering generates an effective 'mechanical adhesion' between the fabric surfaces.

Electrostatic adhesion may also play a role. Weighting the tapestry samples confirmed this observation; when weighted, the tapestry samples slipped before the board passed vertical, so it was possible to calculate the coefficient of friction. This confirmed that the coefficient of friction for these textiles was influenced by the normal load and that they were not experiencing Coulomb type friction, where the coefficient is independent of the normal load.

The effect of friction/adhesion appeared so great that we hypothesised that it would be effective on a vertical surface, with no slant (with the tapestry suspended from the top edge). DIC monitoring of the CTCTAH tapestry fragment mentioned above was carried out to replicate a more realistic display situation and to test this hypothesis. The fragment was suspended with one half in direct contact with the board; a layer of molton fabric was used to cover the board beneath the other half (Figure 2).

Figure 2 (left). The tapestry fragment was suspended from a vertical board. The left half was in direct contact with the board. The board was covered with cotton molton beneath the right half of the tapestry © University of Glasgow

The tapestry was monitored for 340 hours. At the highest recorded RH of 58%, the strain value was very low (a maximum of around 0.01%) in the area with molton, compared with a maximum of almost 0.05% in the area without the molton board covering (Figure 3).

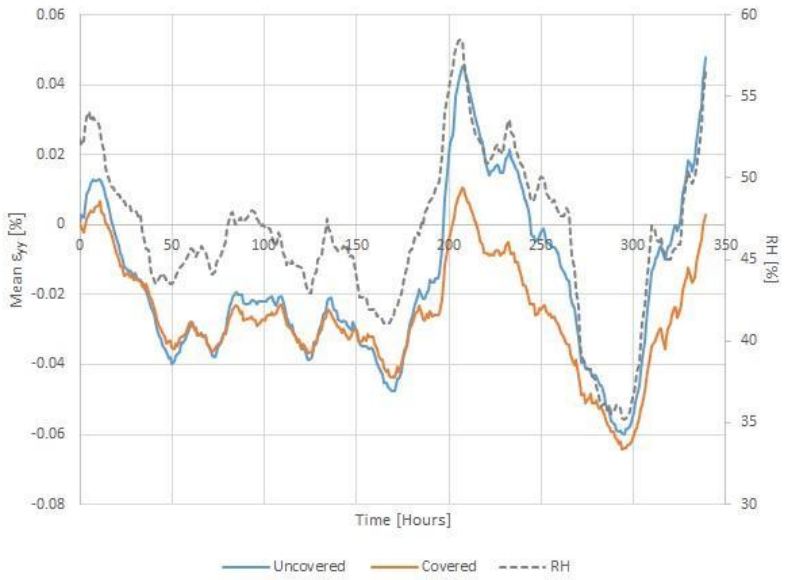

Figure 3 (right). The left side of the tapestry, in direct contact with the board, recorded a higher strain (0.05%) than the right side of the tapestry, against the molton fabric, (0.01%) at the maximum RH of 58%. The board covering conferred greater support to the tapestry and reduced expansion and contraction caused by RH fluctuations © University of Glasgow

While the tapestry on the uncovered board was also supported to some degree, the part of the tapestry on the covered section of the board was less affected by fluctuations in RH than the tapestry on the uncovered board, indicating that the molton board cover had a stabilising effect, reducing expansion and contraction of the tapestry. Although only one test was carried out and there is no statistical certainty, these results indicated that the molton board covering conferred additional support to the tapestry without using a slanted support. Further details of the tests and the results are given in Lennard et al (2020).

Stitched Support

In the UK it is more common to support tapestries by stitching them onto linen fabric so that they can continue to hang on display. A technique developed in the 1960s uses stitching to give structural support and to restore the tapestry image simultaneously (Bosworth and Clark 2006). Little has been published to date on the effectiveness of stitching techniques for tapestry, though a valuable exception is the trial at Historic Royal Palaces in the UK reported by Asai *et al.* (2008).

Our research team was keen to employ the DIC monitoring technique to investigate the effectiveness of different stitching methods used to attach the tapestry to the linen fabric - support lines of running stitches, brick couching and laid couching - and we compared the effectiveness of full and patched supports. It was proposed that a successful stitched

support would allow the tapestry to expand and contract with fluctuations in RH, but would prevent weak and damaged areas from opening up under the tapestry's weight. The resource-intensive nature of a full stitched support system was also recognised; the research team repeated the questions asked by Asai *et al.*: "Was this the most efficient use of treatment time? … was there enough support stitching, or too much?" (Asai *et al*. 2008: 968). Full details of this investigation will be published; an outline is given here.

The main tests were carried out using the new wool rep fabric to model the tapestry; previous work had shown that the warp and weft have similar properties to tapestry weft and warp yarns respectively (Khennouf et al. 2010). It was not possible to use historic tapestry samples for comparative tests, as their weave structure and condition would have been too variable, while resources did not allow the weaving of new tapestry samples. The samples were artificially damaged to simulate an area of weft loss in a tapestry; rows of brick couching and/or laid couching were worked across the bare warps. In some cases a grid of running stitch support lines was added. The stitching was worked through washed linen scrim fabric with two threads from a stranded cotton yarn for the couching, and Gutermann M403 polyester yarn for the grid lines. The samples were suspended vertically from the upper edge, with the 'warp' yarns running horizontally, for 168 hours and monitored with 2D DIC. Strain graphs and strain maps were prepared following the tests and gave information on the deformation and the strain (percentage deformation) experienced globally, by the sample overall, and locally, across the area of damage.

It should be noted that the findings discussed here are based on very small numbers of samples (due to the time taken to carry out the conservation stitching) and do not have statistical validity. Nevertheless we considered them of interest. The main conclusions were that all forms of stitching greatly reduced the strain across damaged areas, in comparison with the damaged, untreated samples which were used as controls – that is, there was less extension in the damaged areas after they had been supported. A grid of stitching alone conferred noticeable support, particularly when the support lines passed directly through areas of damage, in comparison with a grid fitted around areas of damage. Adding more intensive couching to damaged areas reduced the local pseudo-strain further.

In general, as would be expected, the greater the density of stitching across damaged areas, the lower the local pseudo-strain, that is the stitching reduces the opening up of damaged areas. However, it was observed that the most dense stitching (rows of laid or brick couching 8mm and 4mm apart) reduced the local pseudo-strain to a lower level than the overall global strain across the whole sample. In contrast, brick or laid couching at16mm spacing resulted in a stitched support where the global and local strains were very similar.

This was interpreted to mean that with 16mm spacing, the properties of the rep in the damaged area were similar to those in the rest of the fabric, and therefore that this level of stitching was optimal in this situation (though of course these results would need to be re-interpreted in the context of a historic tapestry). Interestingly laid couching appeared to reduce extension to a slightly greater degree than brick couching when they were directly compared – it was more restrictive of movement. Although again there were few samples to compare, this result was found in each test which investigated the two stitching techniques. This could mean that brick couching is better able to accommodate the tapestry's expansion and contraction with RH fluctuations.

When patched and full supports were compared, it was concluded that a patch gives good support if the 'tapestry' is damaged in a discrete area but is basically sound in the surrounding area. If the tapestry is damaged overall, a full support provides better support for weak areas. Strain was noticeably lower in a damaged region if it was encompassed within an overall support structure, even if it was not itself stitched to the support fabric. This is intuitively understood and probably reflects current practice by conservators.

Figure 4. Support patches on the reverse of the tapestry fragment, showing the location and spacing of brick couching. The spacing did not appear to affect the strain data © University of Glasgow

A final stage of the testing used the same CTCTAH tapestry fragment to investigate whether the findings from the model rep samples were replicated on tapestry weave; this was found to be the case. The fragment was treated by stitching in two stages: firstly by applying three patches of linen fabric to the back, securing damaged areas with brick couching (Figure 4), and secondly by giving this area an overall support of linen using a grid of running stitch support lines.

The first stage of treatment showed that extension and strain were effectively reduced in the damaged areas that were supported. However further areas of damage between the patches were not supported and showed high strain values (Figure 5). When the additional full support was applied, strain was much lower in the damaged areas that were encompassed by the support fabric; even when they were not stitched to the support fabric directly, the linen gave noticeable support and prevented extension (Figure 6).

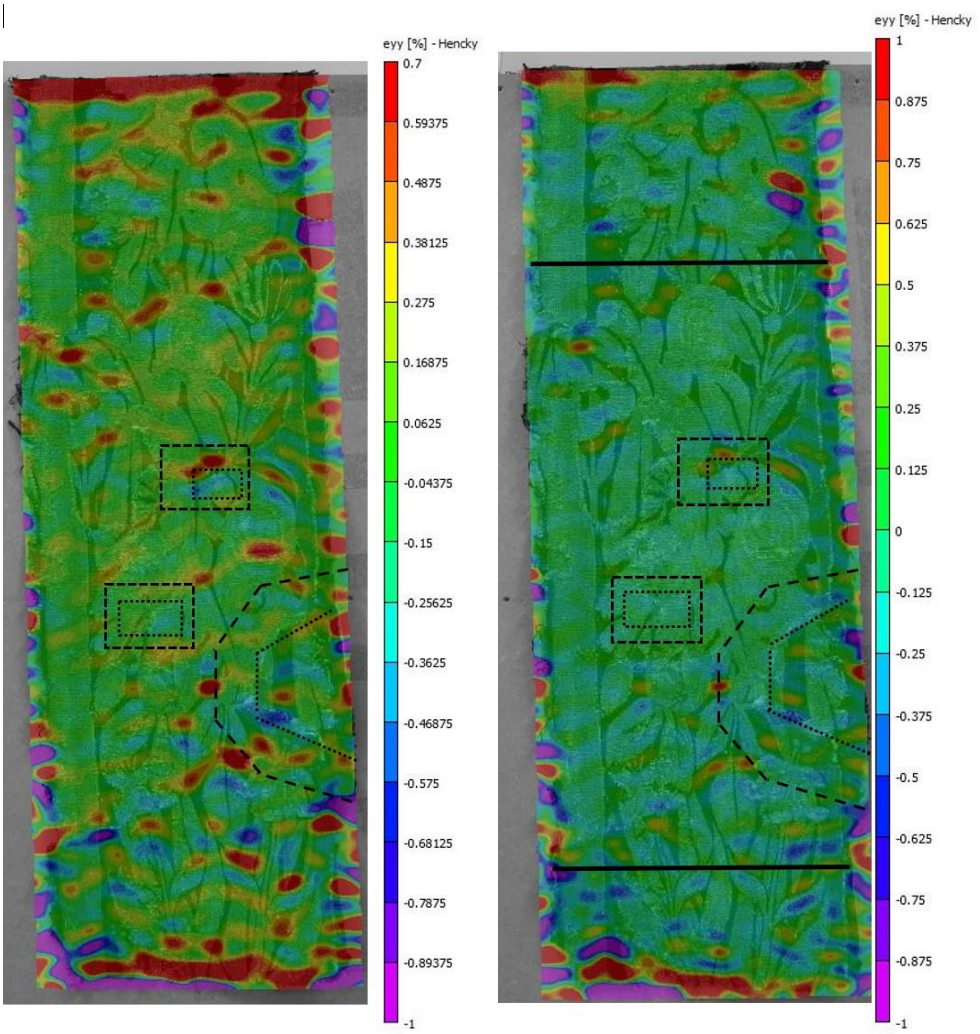

Figure 5 (left). Strain map of the tapestry fragment, showing the location of the three support patches and, within them, the areas of stitching. Strain was reduced in the supported areas but not in the damaged areas between them © University of Glasgow

Figure 6 (right) Strain map of the tapestry fragment after further monitoring with the additional full support. Strain was reduced in the areas of damage encompassed by the support, even if they were not directly stitched to it © University of Glasgow

Conclusions

It is apparent that DIC is a useful technique for assessing changes to tapestries, and other artefacts, over time. It can provide both accurate quantitative data in the form of globally averaged strain measurements, and qualitative, visual information in the form of local strain maps. It has been useful in providing information to help assess the impact of different conservation display and stitching techniques. Further investigation is needed, but the trials on the Glasgow Museums tapestry showed that the DIC technique appears better suited to long-term monitoring than to comparative modelling of two different treatment phases.

The DIC monitoring and friction tests gave useful information on tapestry display and conservation stitching techniques. Importantly the measurements are in agreement with

theoretical predictions in suggesting that the role of friction/adhesion in providing support for tapestries on display is significant even when a display board is vertically positioned. Slanting the board to a small degree adds no further value, but a board covering on a vertical structure provides significant support due to the adhesive nature of the contact between tapestry and board (though we do not know whether this is reduced in the long term).

The stitching trials indicated that all support stitching confers benefit by limiting the extension in damaged areas of a tapestry, even when a damaged area is not itself stitched to the support. It appears that intensive stitching may not be necessary to confer significant support (though of course stitching is also used partly to restore the tapestry image) but it is clear that the placing of stitching is important.

The results overall bore out the intuitive understanding of tapestry conservators. Two common practices are: firstly, in mainland Europe, to apply patch supports in damaged areas, using laid couching stitching, before displaying a tapestry on a covered board; and secondly, in the UK, to provide a full stitched support onto a linen fabric using a combination of grid support lines and local brick couching, for hanging display. These practices appear to combine techniques in an appropriate manner to give good support to a tapestry on display.

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Notes

[1] Research grant from the UK Arts and Humanities Research Council: AH/D001404/1.
[2] Leverhulme Trust Research Project: From the Golden Age to the Digital Age: Monitoring and Modelling Historic Tapestries: RPG-2015-179.
[3] From Context Weavers

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The Removal and Re-installation of a Burne-Jones Tapestry at Exeter College Oxford to Enable a New Glazing System to be Fitted (Live Poster)

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Anne Kvitvang, *Textile conservator, Ak Textile Conservation*
Jonathan Tetley, *Conservator, Tetley Workshop Textile Conservation Cleaning Facility*

The Chapel at Exeter College, Oxford was designed by Gilbert Scott (1811-1878) and consecrated in 1859. In 1886 Rector Lightfoot commissioned the tapestry from two former students of the College, Edward Burne-Jones and William Morris who had already been heavily involved in the interior of the chapel.

Burne-Jones drew the figures while Morris added detail and colour, anxious to harmonise with but not overpower the jewel-like colours of the surrounding stained glass. In 1890 the tapestry was presented to Exeter as a gift from the artists. It was positioned on the south wall exactly opposite where the Rector's wife and daughters would have sat, shielded by a curtain so as not to distract the all-male members of the College. It would have been about the only thing they could see from their secluded spot. Thankfully today the chapel is open to all and apart from regular services and concerts that take place; it welcomes visitors to view not only the tapestry but other beautiful works there.

Figure 1. Old glazing © Georgina Dennis

Therefore, there were many considerations when it came to the conservation of the tapestry and its display. It was important to balance the history of the tapestry, its positioning, and framing within the overall scheme of the chapel with its long-term preservation as well as the need to display it well not only for members of the College but the many visitors.

Due to the frame itself being a part of the decorative scheme, we had to work within its constraints. Previously it had been glazed using two large pieces of glass. These were not only very reflective but hazy and there was a gap of about 2.5cm between the two sheets, causing a disruptive line down the centre of the image and allowing air borne pollutants and insects in. We needed a single glazing sheet to fit 3.6m x 2.5m. Glass would have been too heavy for the existing frame and too large to fit through the entrance.

Optium Museum Acrylic® would be a far lighter weight solution; however, *Adoration of the Magi* is larger than the biggest single sheet of Optium® that Tru Vue® produces. David Palmer at Wessex Pictures suggested considering a new process in America where a company called SmallCorp was working with Tru Vue® to join sheets of Optium Museum Acrylic® with incredibly strong and nearly invisible seams. The process had not yet been used in the UK but having discussed the project closely with Tru Vue® and Wessex, it was decided this was an ideal situation to use such seamed sheets.

Manufactured by Tru Vue®, Optium Museum Acrylic® is anti-reflective and more than 99% UV protective; a key consideration when a display area has both windows and multiple artificial light sources. It also possesses an anti-static coating which can be particularly important when framing textiles. The static charge generated on glazing without such a coating, can be substantial enough to attract friable fibres. It was calculated that the newly manufactured sheet would have just enough flex to fit through the entrance and that it would require only minor internal modifications to the frame to fit securely. The seamed Optium sheets were joined by SmallCorp in Massachusetts and then shipment and installation was coordinated by Wessex Pictures in the UK.

The tapestry was carefully removed from the Chapel and taken to the Tetley Workshop. The lining fabric had successfully protected the tapestry which only required a surface cleaning treatment. The bright colours and supple threads had been obscured by the glazing which had given the impression further cleaning may have been required. The lining was replaced, new Velcro applied, and the tapestry reinstated in the Chapel.

The sheet of Optium® arrived by air from Boston in specially designed packaging and was then transported to Oxford on an A frame. Coordinating a time when the glazing could be delivered, the chapel was not in use, the frame was prepared and the textile team were able to bring the tapestry was almost the hardest part! There was a heart stopping moment when it was brought through the doors and only just made it through, but it was all worth it when the tapestry was re-hung and the new glazing in place revealing the wonderful colours that chime with the stained glass above.

Figure 2. Before glazing ©Studio8Ltd

Figure 3. With Optium Museum Acrylic® in place ©Studio8Ltd

Suppliers

- Tru Vue Inc. 9400 W. 55th Street, McCook, Illinois 60525 USA
- SmallCorp 19 Butternut Street. Greenfield, Massachusetts 01301, USA
- Wessex Pictures Unit 2, Gordleton Industrial Estate, Hannah Way, Pennington, Lymington, Hampshire S041 8JD, England

Conservation Considerations for a Library Collection

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Introduction

The British Library (BL) collection comprises over 190 million items, which grows at a rate of 80 items a day, translating to approximately 8km of shelving per year. The collection includes artefacts from every age of written civilisation, encompassing a large array of material type and including textiles. Textile conservation is a relatively new discipline within the Library, employing a textile conservator, Liz Rose, since 2015. Liz was the first and is probably still the only textile conservator working in a library in the UK. The Library recently hosted a Textile Conservation Intern, Emma Smith, generously funded by the Worshipful Company of Clothworkers.

Textiles in the Library are wide ranging and include archaeological silks, embroidered book covers, fabric maps, flags, Torah mantles and costumes. Due to the cataloguing system, items are not easily searched by material type and therefore it is not possible to know how many textiles are in the collection. Work is ongoing to create an exclusive textile database. Unfortunately, this is far from complete and currently contains around 500 items. There is also the Bookbinding database (British Library, n.d.a), and although this is not exclusively dedicated to textile bindings, it can sometimes aid in the ability to search for them.

The collection is inherently open, and although some items have different levels of restriction, most of them can be requested for use by Readers and consulted in one of the eleven BL reading rooms. Restrictions may include having to request an item through the curator, or having to consult the item at a supervised desk. Further restrictions can be added by curators or requested by conservators if felt necessary. The ability to view the frequency a collection item is accessed can help inform the risk level to collection items.

Within the Library there are several main strands in conservation. Combined, these ensure the collection is maintained despite constant use. This paper will focus on conservation carried out in house for safe use of the collection within the Library by Readers.

- Preventive conservation – preventing damage to collection items through non-interventive methods and maintaining the Library's environment
- Mobile conservation trolley – work requiring approximately 1 hour or less; consisting of small repairs so that items can be returned immediately
- Conservation for digitisation - work requiring less than 5 hours to ensure objects are safe to be digitised; this may also include some cleaning to improve legibility
- Running repairs - work requiring less than 10 hours, most of which is carried out internally and some of which is carried out externally
- Bids conservation - work requiring more than 10 hours which must be agreed by the curator so that it can be scheduled into the annual work programme

- Exhibitions and Loans - work required to enable the safe display of items either internally for exhibition or externally for loan

According to the ten agents of deterioration (Figure 1), the main risks to the collection within the Library have been identified as handling, disassociation, and theft, with objects going through on average eight pairs of hands on the journey to the reading rooms. These risks are very different from heritage collections where items are not routinely handled. Although conservation work is carried out within a framework of minimal intervention, this paper will explore the different conservation strategies employed to ensure the continued use and long-term preservation of this inherently open collection. Both interventive and preventive methods employed to limit the effects of these risks will be explored. A series of case studies will be used to demonstrate the conservation strategies employed to maintain access to the collection and the conclusion will draw out whether these may differ from institutions where the collection is not open to handling.

Figure 1. Ten Agents of Deterioration ©British Library Board

In a UK context, the conservation of textiles for use has been published largely in the context of university and museum collections which are open to handling. For example, French (2010) discusses accessible collections at the Whitworth Gallery Manchester, and Draper (2017) discusses the handling collection at the Manchester Metropolitan University Special Collections. Common themes of these and other such papers include the importance of preventive conservation, easy modular systems of storage which facilitate access and handling, highlighting how care of the collection promotes good handling. The use of interventive conservation methods to ensure objects are able to maintain their functionality despite use appears to be less widely published on. Appelbaum (2007,100), however, states 'objects in use can often be protected by treatment, but may require a greater degree of intrusion than for objects on display'.

Within the conservation literature, the use of collections and the conservation strategies required has long been discussed. In the textile conservation literature, Brooks (1998) discusses decision making in conservation through a series of case studies, how it is not only the condition of the object which affects the conservation treatments employed, but also its role. In the context of the Library, the main role of objects is to be consulted by researchers for the information they contain; here importance is largely given to the written text and illustrations, but can also for example be research into their construction.

The importance of an object's role is also discussed in the wider literature, for example Appelbaum (2007) discusses the use value of objects and how objects which are in active use can present specific conservation problems, specifically noting conflicts between damage prevention and continued use. She notes how any post treatment change is interpreted by conservators as damage, which can be difficult to accept.

In a recent paper by Henderson (2020), the importance of handling collections now and the risks of keeping collections for the future are discussed, notably in preserving the intangible aspects of objects by maintaining their original function. At the Library, the difficulties in managing the often conflicting needs of accessibility of the objects now and extending the lifetimes of objects so that they are available into the future are often felt. Although the prevention of future physical change is important, this has to be balanced with use and the awareness that this will bring physical change. Conservation strategies therefore become a matter of managing and reducing the risk posed by use, by employing both preventive and interventive conservation strategies, as highlighted in the case studies below.

Case Study One: The Bookbinding Re-storage Project

The first case study highlights the importance of preventive conservation strategies, namely proper storage and handling instructions, on the longevity of the collection.

The Bookbinding rehousing programme was initiated to address the long-term storage of approximately 200 textile and embroidered books dating from the fourteenth century onwards. In 2015, on a visit to the basement, it was noted that some of the rare textile and embroidered bookbindings were in very poor condition. Most of these can be accessed by Readers and very few were restricted. A number of bookbindings were consulted (Figure 2); all were breathtaking, some were in poor condition but noticeably the storage was not fit for purpose (Figure 3). This was the inspiration behind the project to rehouse the textile bindings and image, record and catalogue their condition from a textile conservation perspective.

Figure 2. C.24.d.5 ©British Library Board

Figure 3. C.17.a.25 ©British Library Board

On lending three embroidered bookbindings to an exhibition in Utrecht, a storage solution began to be developed. It was decided to pack the items in a way that would facilitate minimal handling during installation and deinstallation. Each volume was placed in a recess on a bespoke silk covered padded board to display the *recto* accompanied by a similar board to display the *verso*. In order to secure the bookbinding in position during transportation 'L' shaped pieces of Plastazote® [1] were placed around

the item which was also wrapped in 30 gsm Bondina® and contained within a bespoke Phase Box® [2] (Figure 4). This design was closely replicated using Plastazote® bases, tops and interlocking 'L' shapes with items wrapped in bespoke Bondina® 4-flap wraps. It is important to note that most of this was cut on the Zund [3] box making machine, making it a time efficient method.

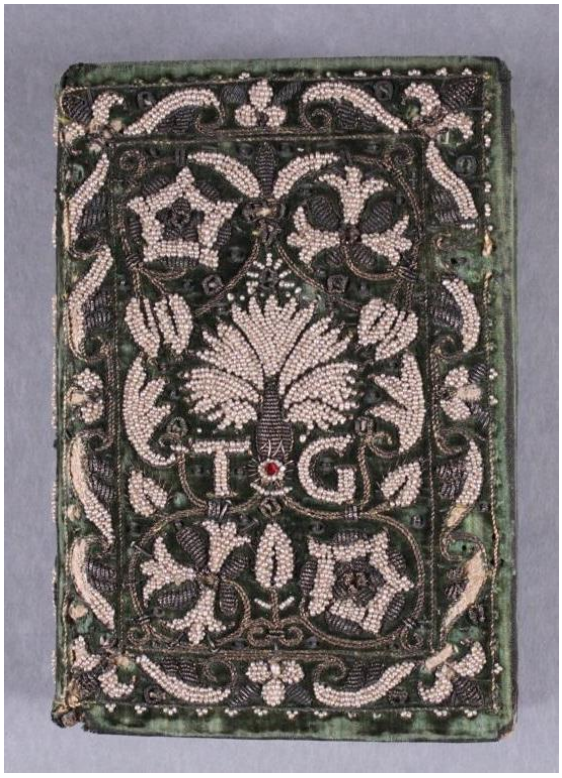
Figure 4. C.g.8.13 packaging ©British Library Board

The re-storage of the textile Bookbindings was a complex project involving collaboration across many BL teams; working with storage management from the outset was imperative to ensure that the consequential growth in size of the collection was accommodated.

Several major advantages are apparent from this project, which relate to the safety of this collection as it continues to be used by Readers. First and foremost, the project has given Textile Conservation the time and opportunity to see, condition check and photograph textile bindings. It has enabled items in very poor condition to be recorded and, through collaboration with curation, has restricted the access or withdrawn access to a small number of volumes. Although this has the impact of initially restricting access, it has produced evidence which it is hoped will become a significant body of work for future interventive conservation to allow these books to be safely returned to an accessible state.

The project has created a positive impact on the future condition of the items through Preventive Conservation strategies. The new storage solution creates additional protection not only in storage, but also in transit to and from the reading rooms and when being used by Readers. The Plastazote® inserts are multi-functional, providing a soft platform for the book to rest on when it is being consulted, and the wraps allow for minimal touching of the textile bindings.

Well packed and stored items subconsciously encourage Readers to treat items with respect, and the enclosed instructions ensure books are properly repacked, maintaining the efficacy of the storage, which is further supported with staff training. As reading room and storage staff have a more constant view of the overall collection than conservation, it is important they receive appropriate training, so that any problems especially those from a preventive conservation and collection security point of view can be noted immediately [4] (Figure 5-6). It is hoped to generate a handling video for textile book bindings.



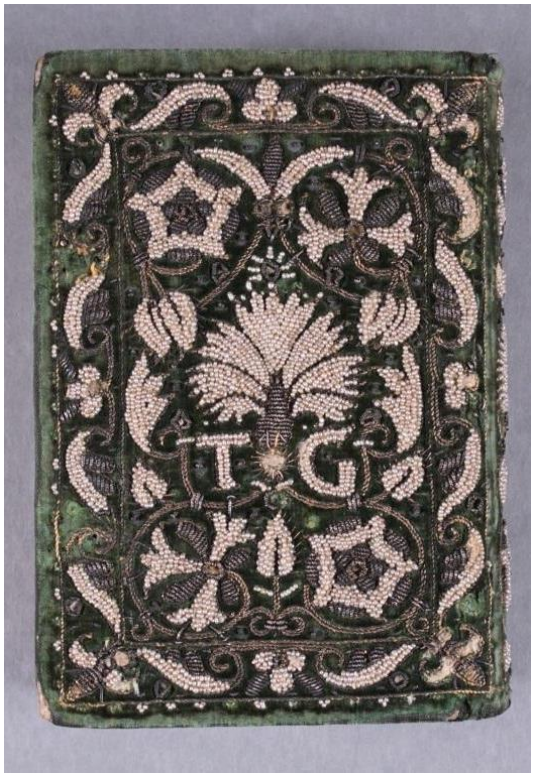


Figure 5 (left). C.23.a.26 recto ©British Library Board

Figure 6 (right). C.23.a.26 verso (missing ruby) ©British Library Board

Overall, this Bookbinding project has supported the BL's minimal intervention protocol through a Preventive Conservation solution, leading to the safer handling, storage, and ultimately longevity and accessibility of this important collection.

Case Study Two: An Interventive Solution for a Textile Covered Qur'an from Ache, Indonesia

As it has been said before, The BL has a policy of minimal intervention. This is however not always appropriate if items are in too fragile condition to be digitised and or consulted by Readers. This was the case with Or 16034, a Qur'an from Aceh, Indonesia, with a linen (?) lining/cover (Figure 7). Interestingly, 'cloth covers were more common than leather bindings' (Gallop 2020) in this part of the world. The item was submitted for treatment through the annual Bid system [5].

Figure 7. Or 16034 (before conservation) ©British Library Board

The front cover was very creased and partially detached from the text block along the joint of the spine and cover. It was agreed that an interventive solution was appropriate in this case. It was decided to reduce creasing through humidification and support the lining with appropriately dyed nylon net. Nylon net has been used frequently at the BL to support textile covers, as it is visually less intrusive than other support materials. It can be used as a slipcover, stitched to itself, or as a remedial treatment for handling purposes (Figure 8); however, in the case of the Ache Qur'an it was stitched directly to the cover lining as necessary.

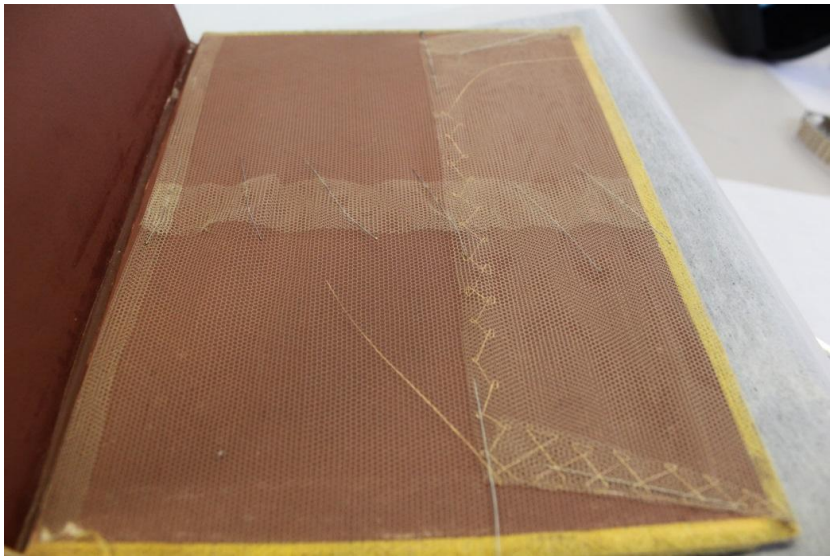


Figure 8. Add MS 10725 inside back cover showing net envelope *©British Library Board*

The finer cotton (?) of the back cover is 'adorned with applique traceries paper cut-outs, in repeating patterns' (Gallop and Fathurahman, in press). It was important not to obscure this decoration or to stitch into the paper leaving irreversible stitch holes,

therefore small net patches were applied to the reverse in these areas. With any such treatment it is important that conservation interventions do not hinder the ability of a volume to open, and therefore an understanding of book construction is important.

As well as restoring the aesthetics, conservation has allowed the manuscript to be made accessible to Readers who request access through the curator, allowing for handling with a reduced risk of loss or damage, with textile elements now well supported.

Case Study Three: A New Acquisition, Digitisation for Access

The Lucas Psalter (Add Ms 89428) (Figure 9) is a new, high profile acquisition. It is considered a work '…of clear artistic and cultural significance ...' which dates from the second half of the fifteenth century (British Library 2020a). Through generous support and external funding this significant volume has been secured for the BL.

Figure 9. Add MS 89428 *©British Library Board*

The item was examined by conservators prior to acquisition. For a manuscript of this date what was immediately noticeable is the intensity of colour of the red velvet binding. Although there are some loose threads, areas where the linen (?) ground is visible, and some loss around the top, bottom and fore edges where the boards are visible, the overall condition of this 500-year-old binding is remarkable.

Textile bindings were a mark of luxury and it was known that red velvet bindings were favoured by Elizabeth I and found in the Royal Library in 1598 (Marks 1998, 59). Four brass bosses and corners protrude from the binding on the *recto* and *verso* which, although fundamentally decorative, would have protected the velvet pile if the volume was stored flat rather than upright; areas of loss along the edges as well as wear to the bosses suggest that it may have been stored both ways. These decorations also aided the attachment of the textile to the wooden boards (Marks 1998, 57). Some of the metal decorations such as the clasps are missing, but impressions are clearly visible in the velvet pile which reveals the original locations, and may provide evidence of rebinding.

It is remarkable that this binding is so intact 'as there are few surviving specimens of the magnificent velvets and brocades used in the late fourteenth and fifteenth centuries' (Barber 1971, 9). Therefore, the research potential is significant. The red velvet is a fascinating topic and could possibly yield information on dyestuffs and technical data about 'the pile and the ground weave through in-depth analytical investigation' (Hofenk de Graaff 2004, 68 and 20) and this too could help inform binding or rebinding dates. It may also be possible to make comparisons with other red velvet bindings of similar dates in the Western Heritage Collections.

The Library has decided to take a minimal approach to the treatment of the textile due to the rarity of the binding so as not to inadvertently obscure any research possibilities. The object is also in a stable enough condition for digitisation and display that a more maximal conservation approach is not needed. It has been important to maintain a dialogue between curation and conservation in order to develop a strategy which aligns with both curatorial and conservation needs.

Although minimal intervention means that handling of the volume must be restricted, the digitisation strategy ensures the volume is made accessible, through creating a surrogate of the object. Prior to digitisation, the loose threads found along the edge of the boards will be sensitively tucked underneath the cover. If this is not possible, conservators will consult with curators to agree another approach. Although the digitisation team at the Library are well trained in object handling, a Textile Conservator will oversee the digitisation process in order to ensure safety of the binding. An appropriate box will also be made for storage.

This approach has several advantages. The Lucas Psalter will be made freely available online, through the BL platform at Digitised Manuscripts (British Library n.d.b). The object will also be placed on display in the free permanent -Sir John Ritblat Gallery: Treasures of the British Library' (British Library 2020a), allowing the public to view and learn about the object, albeit only selected pages will be visible at any one time.

Minimal handling of the object will allow for its long term preservation despite a minimally interventive approach by Conservation. Finally, with such a minimal approach, potential future research on the binding will not have been reduced by interventive conservation approaches. Indeed, the current condition of the object allows for better study of parts of the binding through areas of wear to the velvet.

Case Study Four: Preventing Damage to Modern Acquisitions

As well as its historic collections, the BL is constantly acquiring modern material, much of this through the Legal Deposit Libraries Act (2003). Although much of this material does not require immediate conservation, it is important that preventive conservation strategies are employed from the outset to prevent degradation of objects over time.

Here, a recent acquisition by the European and American Collection, containing textiles, will be looked at to understand the preventive conservation strategies employed. Two conservators are employed to undertake small repairs [6] to the Library collections ensuring

upkeep. A small amount of the Textile Conservation workload is allocated to this, including the work outlined below.

7S, or Seven Silks (Cup.937/1164), is an artist's book project released by Jen Bervin in 2018 (Bervin 2018). The project elaborates upon a six year collaborative research project that inspired the book, *Silk Poems*, comprising physical materials that informed the research. The object is packed inside an original archival card box, an interior Plastazote® support, and a printed label on the outside of the box reading "Seven Silks, Jen Bervin, 8/100". Inside the box are two prints on silk fabric within Melinex® folders (Figure 10), a signed copy of the book *Silk Poems,* a glass jar with a black plastic lid containing a Bombyx Mori silk cocoon, three glass vials with black plastic lids containing a silk print of the lifecycle of the silkworm, a skein of silk thread, liquid silk fibroin, and a colophon printed on paper.

Figure 10. Cup.937/1164 *©British Library Board*

The main concern of the object going into the reading rooms was that the vials may be opened by a reader, with the small elements and liquid vulnerable to loss or theft. It was important to find a method of sealing the vials which was minimally visually disturbing as to not disrupt the artist's original intention, easily reversible, and did not pose risk of contaminating the samples within. It was decided an external fixing would be best to make the method easily reversible and avoid contamination. Tests were first undertaken to surrogate vials to find a suitable adhesive concentration and carrier for securing the lids, and to ensure reversibility. The vials and the jar were sealed with tabs of black cotton lawn impregnated with 20% w/v Paraloid B72® [7] in 50:50 Acetone:IMS [8], secured to the outside of the vessels securing the lid to the glass. This was found to be strong enough that the tabs were not broken if the vial was attempted to be opened, nor could they be picked off, however can easily be reversed by swabbing with acetone.

Although storage had already been well considered by the artist, with the use of archival materials, several additions were made to further minimise risk. The three vials were able to move up and down within their recesses, and the colophon as well as the original box and label needed additional protection. A rectangle of Plastazote® secured to the lid of the box

using hot glue prevented the vials moving. The colophon was placed inside a Melinex® folder. The original box was placed inside a conservation grade phase box.

Handling instructions were also made to accompany the object. These instructed readers to handle the object with clean hands on a clean surface, described which order objects should be placed back in the box and instructed readers not to attempt to open vials or shake them, and not to remove items from Melinex®.

Although the majority of collections would likely not have considered any treatment to this new and recently acquired object necessary, in the context of the BL, it is important to consider how risk can be minimised from the outset.

Although simple solutions are employed, they highlight the importance of considering future damage to objects as soon as they enter the collection, as well as taking time to develop bespoke documentation to accompany objects to inform handling.

Another artist's book, *Five charms for the potingair: poems & original essential oil blends* by Rebecca Sharp (RF.2018.a.251) is being considered for a similar treatment. The object contains vials of essential oils, to be inhaled by the user on reading each poem, thereby posing additional conservation questions. Sealing the vials takes away from the artist's intent, however the oils are a finite resource specially blended by the artist, that may also pose risk to the book if not properly sealed. A satisfactory solution has not yet been found.

Conclusion

This paper has explored some of the conservation strategies employed by the BL to ensure both the accessibility and long-term preservation of the collection. Specifically, conservation aiming to reduce risks posed to the collection, with the greatest risks found to be handling, disassociation and theft, through interventive and preventive strategies, carried out within a framework of minimal intervention.

One of the main tools employed by conservation are preventive strategies. Preventive conservation is important from the outset, as highlighted by case study four. When an object enters the collection, it is important to assess how potential risks from use can be minimised. As highlighted by case study one, reducing risk to the historic collection is also important, in updating old storage methods.

The case studies highlighted focus on storage and reducing risks through handling, protecting the collection in storage and in transit, promoting good handling and reducing damage potential. It is important that the methods chosen make handling and access as easy as possible for Readers, for example the use of simple handling instructions, including handling boards and using Melinex® folders. Many of the solutions noted are small changes which may not require much time; this is especially important for a large and constantly growing collection.

As well as reducing risks from handling, additional security measures are also noted, for example in sealing vials to protect the content within. Although proper storage is important for all heritage collections, it could be argued at the Library we go further with the

preventive conservation strategies used than is necessary for collections that are not routinely accessed, due to the differing risks this poses.

Also discussed are more interventive conservation strategies used to ensure the collection is able to withstand handling. In general, where objects are not thought robust enough to withstand handling, or where handling is likely to exacerbate damage, interventive methods are used to stabilise the collection. As was noted in the introduction, it is important that small damages which occur to the collection through regular use are repaired, with specific conservation time given to this.

Oftentimes however, more in-depth treatments, especially to the historic collection are needed. This is highlighted in case study two, where a nylon net support was added to the textile cover of a Qur'an. It is important here that a balance is maintained between long-term preservation and functionality of the object, for example a book needs to retain the ability to open and it is therefore important to have an understanding of an object's construction, meaning textile, book and paper conservation often work together closely.

Professional and ethical judgements are always made when reaching conservation treatment solutions and whilst these may be tempered when reflecting on the use of the object within the context of the Library they should not dramatically alter the final agreed treatment.

As noted in case study three, there are ways of reducing intervention and yet maintaining accessibility of the collection. Digitisation is increasingly important at the Library, creating a digital copy of the object as surrogate. As well as reducing the need to handle the object, this increases accessibility as the copy can be made available outside the Library building. In case study three, minimal intervention has been especially important due to the rarity of the binding, in order to preserve research potential of the object by reducing conservation interventions. Preventive conservation tools, notably storage, are employed to ensure long term preservation of the object when not on display or in use.

All projects, in their very different ways support the Library's core statement of 'custodianship' and mission statement to '…make our intellectual heritage accessible to everyone, for research, inspiration and enjoyment.' (British Library 2020b)

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Colleagues at the British Museum

Notes

[1] Plastazote® - 28mm archival support foam
[2] Phase Box® - one piece box made from conservation grade folding box board
[3] Zünd – box, mount and Plastazote® cutting machine
[4] C.23.a.26 – ruby missing from verso (back cover)
[5] Bid system – estimates submitted to bid for hours of conservation which populates the annual work programme
[6] Running repairs – conservation treatments under 10 hours
[7] Paraloid B72® – copolymer of ethyl methacrylate and methyl acrylate used as an adhesive or varnish
[8] 50:50 Acetone:IMS – 50% Acetone and 50% Industrial Methylated Spirits solution

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Materials and Suppliers

- Acetone. VWR International; Hunter Boulevard, Magna Park, Lutterworth, Leicestershire LE17 4XN; Tel. 01455 55 86 00 uksales@vwr.com
- Bondina®. Preservation Equipment Limited, Vince's Rd, Diss IP22 4HQ, Tel. +44 1379 647400 https://www.preservationequipment.com/
- Folding box board. Conservation By Design; 9 Newmarket Ct, Kingston, Milton Keynes MK10 0AG; Tel. +44 1234 846300 https://www.cxdinternational.com/
- Folding box board. Klug-Conservation; Zollstrasse 2, 87509 Immenstadt, Germany; Tel. +49 (0)8323 9653 30 info@klug-conservation.com https:/www.klug-conservation.com

- Industrial Methylated Spirits (IMS). VWR International; Hunter Boulevard, Magna Park, Lutterworth, Leicestershire LE17 4XN; Tel. +44 (0)1455 55 86 00
  uksales@vwr.com

- Paraloid® B72. Preservation Equipment Limited; Vince's Rd, Diss IP22 4HQ; Tel. +44 1379 647400 https://www.preservationequipment.com/
- Plastazote®. Preservation Equipment Limited; Vince's Rd, Diss IP22 4HQ; Tel. +44 1379 647400 https://www.preservationequipment.com/

- Box making machine. Zünd UK Ltd.; Unit 1 Spring Valley Business Centre, Porters Wood, Hertfordshire, AL3 6PD St Albans; Tel. +44 17278 33003
  salesuk@zund.com

A Stitch in Time: Stabilising the Textile Samples within the Board of Trade Volumes

Solange FitzGerald, *Book and Paper Conservator*
Dr Lucia Pereira-Pardo, *Conservation Scientist*

Introduction

This paper summarises the research and conservation of early 20th century textiles within the Board of Trade sample books. The research was carried out by conservators and conservation scientists at the National Archives, London in 2018-19. The National Archives hold the Patent Office Registers with samples of registered textile designs from 1842 onwards. The collection belongs to The National Archives and consists of almost three million designs for textiles, glasswork, metalwork, ceramics, furniture, wallpaper and other decorative arts and manufactured objects. These designs are in the form of drawings, paintings, photographs and product samples, sent to the Designs Registry, part of the Board of Trade (BT), to be registered for copyright protection between 1839 and 1991.

The National Archives is the official archive for the UK government for England and Wales. Of its many services, one is to provide public access to its holdings, another is to secure and preserve its collection in both physical and digital format for future generations.

The responsibility and obligation of service to the public is only one contributing factor in influencing many conservation projects. Together, the necessity to understand our collection and to adapt and adopt new skills and techniques help to influence the direction for the project milestones and the hoped outcomes. With this in mind, four main aims became the focus of the project. These aims are listed as follows but not necessarily in the order of significance.

Aims:

- To investigate the cause of a pink discolouration of the paper in contact with some of the textile samples.
- To establish an innovative conservation treatment for the fragile and oversized textile samples that will remain within the volumes.
- To assess priorities and options for potential loans and exhibitions.
- To make the volumes more publicly accessible while retaining their original format.

Description of Registers and Sample Books

The Board of Trade collection comprises 1,730 oversized volumes with an estimated 3 million samples or representations in the series (Figure 1). The collection comprises submitted samples of different businesses together in numerical order of registration. The whole collection is a historical representation of the fashion, design and materials used at the time. They are not only collected objects held within an archive setting but collected as a form of process and formality (Pearse 1994).

Figure 1. Textile sample book BT50/536 ©Crown

Figure 2. Textile sample book BT50/536, folded textile samples ©Crown

Before 1839, Copyright protection was available in the UK for some textiles. This was not the case in other areas of the decorative arts, such as glass, metalwork, ceramics and wallpapers. The individual design samples are known as 'representations' which can be an eclectic mix of drawings, paintings, photographs or samples of the design, such as wallpaper or textiles, submitted at the time of registration. Each textile representation is folded and pasted into large bound volumes, all stamped with a design number in the order of registration (Figure 2).

The registers are separate volumes to the representation's volumes. These include the identity of the copyright owners or 'proprietors' – usually the manufacturer or retailer rather than the designer –, the date of registration and sometimes a description of the design. As registration was not compulsory, there are many commercially produced designs that can be found elsewhere. At the National Archives, London, these registers and representations have been split into various record series, each one determined by the most recent Act of Parliament in place when they were registered.

Between 1842 and 1883 all representations were issued with the registration number when a design was registered by the Patent Office, but only for designs registered under the terms

of the 1842 Ornamental Designs Act. It can also be observed that the designs were at this time registered with a diamond mark. These marks are important, as they not only demonstrate that a design was registered, but that it was designed in Britain and it provided a layer of protection against fraud.

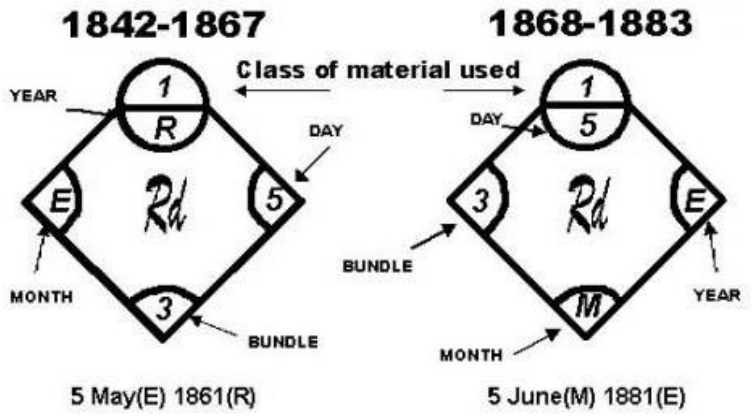

Figure 3. Diamond marks

Diamond marks were printed, engraved or otherwise marked on an object – for example, on the reverse of printed fabric (Figure 3). These are easily identified by the shape of a diamond with numbers and letters at specific points to represent the type of material used and the date of registration. The diamond mark tells you that it dates from between 1842 and 1883.

The mark at the top of the diamond represents the material the item was made from. The number codes on a diamond mark represent the day of registration and the letter codes represent the year or month the design was registered (Old copper).

Description of the Volume BT50/536

The BT volumes in their original format are cumbersome; each one capable of holding a minimum of 600 textile samples of various sizes. When deciding on an appropriate conservation treatment or housing solution, the main priority was to maintain the original format of the volumes by retaining all samples, in the order of registration, within the volumes.

The textile samples within BT50/536, *circa* 1904, were of varying sizes and design patterns, ranging from light cottons to heavy upholstery fabrics. It has been noted that it was the design that was being registered rather than the actual piece of fabric, suggesting that the cotton cloth support for the design is incidental (Greysmith 1985).

For a sample to qualify for registration each was to be the size of one and a half-run print, hence the often oversized samples (Figure 4). By the end of the 1840's machines were

capable of printing designs with 10 or more colours, though they seldom did, and were soon able to print up to 15 (Greysmith 1985). Each sample was stamped, mainly in a black ink onto a paper label, showing the registration number. Each number represented the sample, the proprietor details such as name, address and date of registration.

In most of the sample books, the representations were adhered to the recto and verso of each page, fitting numerous folded samples in a column. The bulk of the folded samples caused the distortion to the volume text block and cover boards, which needed to be addressed. This became one of the four project aims.

Figure 4. Textile sample book BT50/536, oversized textile sample ©Crown

Condition Assessment of BT50/536

The condition assessment of the volume began with a visual examination of the textiles, the paper substrate and the binding structure. This revealed the true condition of the volume and its contents. The intention was to establish a minimal treatment solution that can be applied across our extensive and popular BT collection that remained sympathetic to the original binding structure. Despite the volume's exposure to poor handling and high production as well as unsatisfactory housing in past years, it remained in good condition. Areas of mechanical damage to the paper substrate was mainly due to the weight of the textile samples it held as the turning of each page caused weakness and tears to the paper.

The textile samples retained their vivid colours and remained attached to the substrate but had heavy surface dirt and creases where they had unfolded and protruded unprotected from the text block. A solution to the unfolding of the textiles was vital not only for the welfare of the samples but for its future handling and storage.

It was observed that there appeared to be a pink discolouration of the support paper that was in direct contact with the textile. It was decided at this point that scientific analysis was required to investigate the cause of the discolouration.

The binding structure was also assessed at this point where concerns for the distortion of the covering boards were discussed. On closer inspection, it was felt that the distorted shape of the boards highlighted the stress due to the bulk of the samples within but

remained a protection for the contents of the volume. They had now wrapped around the contents but continued to be a source of protection for the samples. A replica of the volume with distorted convex boards was created. The intention was to prepare for a change in the shape of the volume post treatment. This would enable experimentation with the replica rather than with the original volume.

Conservation Treatment

Prior to any conservation treatment and what is standard departmental procedure, written and photographic documentation was carried out as part of the condition assessment for the volume. At this stage of the assessment all the treatment options, production and housing considerations were discussed and planned in advance as much as possible. The one constant was the desire to keep the volume intact and not remove or rehouse any of the textile samples.

The conservation treatment was carried out in different stages. This involved the *in situ* cleaning, stabilisation and rehousing of the oversized textile samples in bespoke bags. These bags are attached to the text block using Velcro tabs, in the original location, but can be removed from the text block when viewing is required. The samples required mould cleaning only. The irreversible process of washing was discounted and considered unnecessary. The soiling is mainly due to surface dirt and poor housing, but we remained mindful of protecting the soiling that is preserved on historical textiles, which may have evidence of genetic information (Eastop. D 1996).

Prior to any conservation treatment, the cleaning was carried out in a contamination room where PPE and the appropriate vacuum table were used. All the textile samples, the paper substrate, the covers and the box it was housed in were vacuumed with a HEPA filter vacuum. The mechanical cleaning of the paper substrate was carried out with a smoke sponge. The textile samples, paper substrate and the covers were brushed with a soft Japanese brush to remove any remaining dust or debris from the mechanical cleaning.

Once the mechanical cleaning was complete, attention to the removal of creases from the most severely creased or damaged textile samples was required. This was only necessary if the textile sample was oversized and protruding from the text block. Where the textile had unfolded, it was refolded to protect it within the volume. In most cases, the textile was refolded without detaching it or removing it from the text block**.** Experience as a book and paper conservator has shown that the easing of creases on materials such as parchment, leather and paper is not an easy task. On using magnets on parchment in past treatments to ease out folds and creases and to reduce the use of moisture, it was thought that they could be used in the same way and for the same reasons on the textile samples. The textile sample was placed onto a magnetic sheet where tiny neodymium magnets were positioned in the creased areas and remained there until the creases had visibly flattened (Figure 5). The same technique was also used without moisture in the less severely creased textile samples. On completion, the textiles were refolded *in situ*.

Figure 5. Textile sample book BT50/536, neodymium magnets on textile sample ©Crown

In most cases, the textile samples were partially attached to the paper substrate. A minimal amount of *Shoufu* or *Jin Shofu* wheat starch paste was used to reattach the textile sample to its original location, if required.

Figure 6. Textile sample book BT50/536, textile sample rehoused in netting support ©Crown

Stabilisation of Fragile Textiles

Advice from textile conservators at Hampton Court Palace resulted in a sympathetic stabilisation solution for the fragile textile samples. A textile support of netting was used to replace the past housing of a polyester pocket. The polyester did protect the samples but

was deemed to generate too much static that could pull the loose and fragile threads, and the sharp edge could cut into the textiles that lay on the opposite page. It also contributed to the bulk of the text block. Different sewing techniques were applied to various samples to stabilise loose threads in the most fragile areas of the textile. The stitching used was running and laid-couching stitch. The thread used was Gutermann Skala invisible polyester thread similar in colour to the sample and a net support (Figure 6).

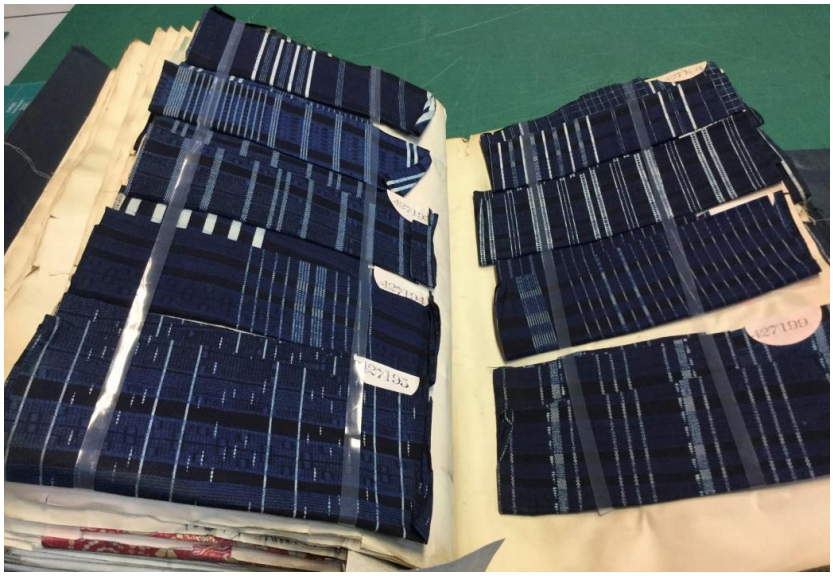

Figure 7. Textile sample book BT50/536, polyethylene strapping ©Crown

During the condition assessment of the volume, one of the main concerns with the textile samples was that each sample unfolded with the turn of each page. There can be four to six samples both recto and verso of each page. These volumes are producible documents. This means that they are available to the public to order viewing in the reading room. As the samples are folded, it is necessary to unfold each sample to view. The reader is required to refold the sample each time, but regardless of this, they can unfold with the turning of the page. Due to this having an impact on the long-term condition of the samples, a housing solution that would not add to the existing bulk within the volume was vital. Having already made a replica of the volume, it was useful to experiment with different housing options.

The solution that worked for both the reader and in holding the samples folded in position was introducing a polyethylene strip with a Velcro patch that would strap the textiles in place and prevent the samples from unfolding when the pages were turned. The straps can be opened for access and closed when complete. The strapping proved to be a simple and effective housing solution for the textile samples that does not add to the existing bulk (Figure 7).

The paper text block is a heavy weight cream toned paper that appears to be acidic. A pH test on the paper text block confirmed that the paper was very acidic. The weight of the samples, often with four or more samples on the recto and verso of each page caused the paper to tear on turning. Repairs to the paper required a heavyweight Japanese tissue and a dry *Shoufu* wheat starch paste in order for the repair to be effective. Repairs with a lightweight tissue were not successful.

Figure 8. Textile sample book BT50/536, book cloth cover ©Crown

During the condition assessment, concerns were expressed regarding the distortion of the cover boards. It was decided to refold and secure the samples in their allocated place within the text block. It was hoped that this would reduce the bulk that in turn would ease the tension on the joints on the cover. The cover boards remained in their inherited shape but continued to function, as they should in protecting the samples within.

Repairs to the joints on the cover were completed using a book cloth of a similar colour to the original. As the volumes remained intact, a bespoke book cloth dust jacket was developed with cloth handles, to aid the removal of the volume from the box (Figure 8).

The Issue of Loans and Exhibitions

Another issue that needed to be discussed was the complexities of external loan and exhibition requests. An external institution hoping to exhibit textile samples from various BT volumes approached the loans team within Collection Care. The loan request raised a number of questions concerning the method of display and the ethics of removing and unfolding the over-sized samples for the purpose of display. There was also the question of rehousing the samples post exhibition if removed from the volume.

Part of the loan process involves the requirement on behalf of The National Archives to make a security copy of each document that is on loan. If the National Archives requested that the whole volume had to be displayed in its original format, then all contents would require imaging. This would be at a great cost to the requesting institution.

If the decision were made to remove samples from the volume, a number of considerations would require discussion between the borrower and lender. This would continue throughout the whole loan process.

The adhesive used to attach the samples to the paper and the solubility of the dyes would be tested and identified in order to remove the samples from the volumes without causing

irreversible damage. Whatever the decision, it sets a precedent for all subsequent loans. The matter would be addressed on a case-by-case basis and discussions between the requesting institution and the lender (The National Archives) would take place.

What can Cause the Pink Discoloration of the Paper Substrate?

During the condition assessment, it was apparent that scientific analysis was required to investigate and establish the cause of the pink discolouration that replicated the textile pattern onto the paper substrate. This discolouration was apparent with some textile samples of varying dye colours throughout the volume, all dating 1904. This did not appear between textiles that were in contact with each other. Initial thoughts were that the pink discolouration could be connected to the dyes in the textiles and/or the size (rosin) within the paper.

To ascertain this, TNA-CCD's conservation scientist carried out non-invasive analysis of design 427167 from volume BT50/536, as this was the textile sample that caused the most intense paper discolouration (Figure 9).

Figure 9. Textile sample book BT50/536, offsetting of sample 427167 ©Crown

Non-invasive analysis included:

- pH measurements of the textile and paper substrate following micro-extraction with deionised water
- Fibre Optics Reflectance Spectroscopy (FORS) in the UV-VIS-SWIR range (350-2500 nm) of the different printing inks in the textile and the pink discolouration.
- Elemental analysis by means of portable X Ray Fluorescence spectroscopy (XRF).
- Fourier Transform Infrared spectroscopy (FTIR) in Attenuated Total Reflection mode (ATR).

The FTIR-ATR analysis showed that the textile substrate is cotton, but was not sensitive enough to detect differences between the areas printed with different colours, between the blank and discoloured paper, nor to detect the presence of rosin. The pH measurements determined that the paper substrate is acidic (4.3-4.6); however, the textile sample is in the range of the extraction water (6.3-6.8). The elemental composition of the blank and discoloured paper is very similar: calcium, chlorine, sulphur, small amounts of iron and

silicon and traces of aluminium were detected (perhaps suggesting the presence of alum-rosin).

Some areas of the paper and the textile also showed the presence of chromium, copper and arsenic, likely related to the composition of some of the printed inks, for instance chrome dyes were used from the 1890s. The FORS spectra of the pink discolouration on the paper points to the presence of an organic red dye, likely synthetic.

Through literature review and discussion with researchers on early synthetic dyes, we concluded that synthetic alizarin red in printed textiles was connected with similar paper discolouration phenomena in textile sample books of the same chronology (1880-1918) (Baglia R A 2018; Holly M 2019). If the excess dye in the textile is not fully washed away, it overloads the textile fibres and, when the environmental conditions fluctuate, it can migrate to the paper in close contact with the textile sample.

To confirm the presence of synthetic alizarin dye, the non-invasive analytical techniques available onsite at TNA were not enough, and therefore micro sampling for more sensitive destructive analysis was required. Thanks to a collaboration with researchers from the University of Edinburgh-National Museums Scotland, a loose textile fibre taken from the edge of sample 427167 was analysed by means of Ultra-performance liquid chromatography (UPLC) coupled to photodiode array detection (PDA) mass spectroscopy, following the protocol developed for synthetic dye analysis at NMS by Troalen et al (2014). The presence of synthetic alizarin red was confirmed in the three subsamples from the multi-coloured fibre: red + yellow, blue green and blue + brown (Sandstroem E & Troalen L 2020).

Conclusions

The distorted book boards combined with the desire to retain the original structure of the over-sized volume presented a real conservation challenge. Steps were taken to help make the volume more accessible, including applying minimal repair and stabilisation techniques to fragile textiles, strapping the folded textiles in place for ease of access and refolding the oversized textiles to reduce the existing bulk. The treatments proved simple yet effective and provided a way to retain the original binding while also stabilising the textiles within the volume to allow it to be accessed by the public without specialist handling supervision.

Identifying the most likely cause of the pink discolouration on the paper substrate (transfer of the excess alizarin red dye to the paper under fluctuating environmental conditions) was helpful to ascertain that keeping the sample books in a stable environment should prevent further discolouration.

The focus of this project may have been on a single volume in the collection but the combined conservation treatment and scientific analysis resulted in conclusions and some positive outcomes. This project provided the means to be involved in cross-disciplinary collaboration with textile conservators from Hampton Court Palace and scientists from the University of Edinburgh, National Museums Scotland and Hochschule Niederrhein University, Germany.

The project aims were not solely about the conservation of a large collection held at the National Archives. It was more about the objects themselves and what improvements can be made in order to make them more accessible to the public. The intention was not to alter their physical format but to enhance the impactful experience of being handled and viewed without restrictive demands. It was hoped that this would improve the historical and aesthetic qualities of the objects. They offer a window into the society of the time allowing for a better understanding through study and observation by us, of the physical or material objects generated by those societies.

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- Japanese Paper. T.N. Lawrence; 208 Portland Road, Hove BN3 5QT; Tel. 0845 644 3232/01273 260260 artbox@lawrence.co.uk http://www.lawrence.co.uk/index.html
- Japanese Paper (including 11gsm. Tengujo). Schempp; 70806 Kornwestheim, Germany; Tel. 07154/22233, 0172/6204221 mail@schempp.de http//www.schempp.de
- Stabiltex, Polyester Crepeline. Plastok Associates LTD; 79 Market Street, Birkenhead, Mersyside CH41 6AN; Tel. 0151-666 2056 sales@plastok.co.uk www.plastok.co.uk
- Aero Linen, Aero Cotton. Samuel Lamont & Sons LTD; Riverside Factory, Victoria Street, Lurgan, County Armagh, BT67 9DU Northern Ireland; Tel. 0282-564 8814
- Magnets (3mm dia x 2mm thick N42 Neodymium Magnet - 0.27kg Pull). First4magnets. MAGNET Expert Ltd, Walker Industrial Estate, Ollerton Road, Tuxford, Nottinghamshire NG22 0PQ
- Benchmark Polyethylene Strapping. University Products Inc.; 517 Main Street, Holyoke, MA 01040

Conserving a 'Basketful of Errors': A Collaborative Project to Stabilise a Textile Bound 1717 'Vinegar' Bible

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Books and textiles, and any approach to their conservation, have a great deal in common: they are both fluid and mobile objects, made with materials that are required to move and flex to enable use whilst throughout this, maintain strength and beauty. Their historical construction is firmly organic, with proteinaceous and cellulosic components as their basis. Repair methods centre on mechanical, rather than adhesive methods where possible. They are the carriers of aesthetic values and attitudes, reflecting the tastes of their owners and the time of their construction, sometimes in stubborn opposition to their function. One such object is the 1717 Vinegar Bible owned by the parish of St Mary's Church in Avington, Hampshire, an impressive bringing together of the binder and the broderer's art (Figure 1-3).

Figure 1-3 (left to right). The right and left boards and spine, viewed from the perspective of spine-on ©Victoria Stevens Conservation

Textile bindings had two main periods of favour, they reflect times where opulence was encouraged. Firstly, in the later Tudor and early Stuart period, where the textile base was commonly velvet and secondly, a revival to reflect the flamboyance of the Restoration period in the mid to late 17th century, with satin bindings being preferred by bibliographical fashionistas. Whatever the substrate, the embroidery was at the fore.

As bindings for predominantly devotional texts, their style was very much in line with the liturgical textile tradition of earlier Opus Anglicanum work. In these bindings, the embroidery took the place of the tooling in conventionally bound books, providing

elaborate and highly tactile decoration. As with conventional binding, this decoration could reflect ownership and patronage, as here with one of the most well-known textile bindings, the Princess Elizabeth's gift to her step mother, Katherine Parr (Figure 4-5).

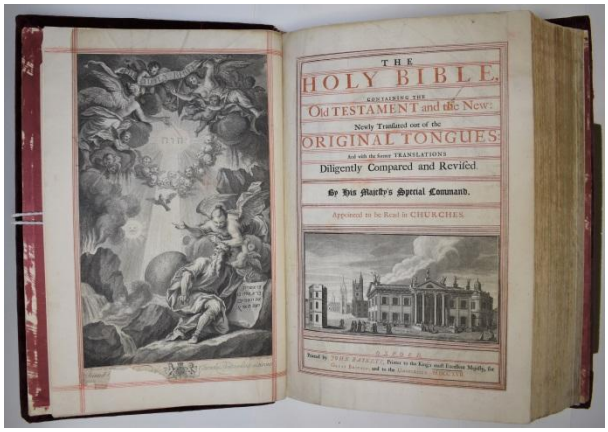
Figure 4 (left). 16th C and 17th C stylistics: a textile binding given by Elizabeth Tudor to her stepmother Katherine Parr; Oxford, Bodleian Library MS. Cherry 36 [1] © Bodleian Libraries University of Oxford

Figure 5 (right.) 17th C example of the textile binder's art; Oxford, Bodleian Library Douce Bib. NT. Eng. 1625 g.1 [2] © Bodleian Libraries University of Oxford

The couched stitching in these bindings had a secondary, protective function, with raised metal thread work and an excess of bullion knots providing some resistance against wear to the textile base. They would have been undoubtedly executed by professional crafts people, although the Bodleian suggests that the work on Katherine Parr's gift is from the hand of the future Queen Elizabeth herself. These bindings are truly remarkable, small jewels of delight that please both the eye and excite with somewhat uncomfortable wonder at their fragility to perform the task they have been set.

Avington's Vinegar Bible is such a jewel, and with its unusually large proportions has the feel of a Koh-I-Noor of embroidered bindings. It is a noteworthy object for several reasons, based largely around a catalogue of errors and miscalculations.

Firstly, it is a rare printing, being one of the canons of Bibles with quirky errata, when the luckless printer John Baskett made a stunning typo and turned the parable of the vineyard into that of the vinegar in the page header for Luke, chapter 20 (Figure 6-7)[3]. Unfortunately losing credibility – and gaining many puns on his name – Baskett's monumental edition of the Bible is nonetheless considered among his most important works, highly regarded for its generous printing with large and elegant type, broad margins and extensive engravings and decorative headers and initials.



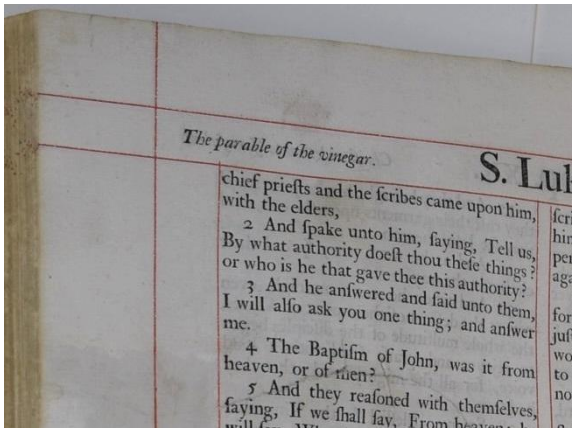


Figure 6 (left). The title page & frontispiece with western paper infills ©Victoria Stevens Conservation

Figure 7 (right). The (in)famous printing error ©Victoria Stevens Conservation

Secondly, the Avington Bible has a strong local provenance to its current location through the Dukes of Chandos [4]. The Bible was likely the property of the first Duke of Chandos, James Brydges [5], and was possibly part of the collection at Cannons, the family seat in Middlesex. However, having lost substantial sums in the South Sea Bubble of 1720 and running up encumbering debts as his legacy to his son, the second Duke, Cannons was demolished in 1747, dispersing the contents. It is likely to have been brought to Avington by the 3rd Duke of Chandos [6] who lived in Avington Park and who paid for the building of the church in 1768 – 1771 [7]. The church, like the Bible, is a beautiful example of the aesthetics of its age, with an elegance that provides a sharp, and not unpleasing, contrast with the exuberant rococo of the binding (Figure 8).

Figure 8. The beautiful Georgian interior of St Mary Avington ©Rosemary Oakeshott, CC BY-SA 2.0

It is likely that it is this exuberance that has ensured both its deterioration yet also its survival. During the three hundred years of history it has traversed, in a predominantly complete condition, to be with us today.

A literature review of conservation journals over the past thirty years reveals that where textile bound books have been conserved, they are usually housed in an archive, library or museum, separate in some ways from their intended use, restricted in access and in an environment that can be monitored and controlled. The Vinegar Bible is in the care of the church's parishioners and parish council without the same access to the wide range of preservation resources and staff that support museum and archival collections.

For an item of such fragility, this is quite a responsibility but one that has been executed well over the time it has been in the care of the parish. Until recently, when not in use, the Bible has been carefully wrapped in a cotton sheet and kept in a wooden chest in the bell tower of the church. Its great weight has meant that it was difficult to manoeuvre and the awkward act of lifting it in and out of the deep storage chest required two people to achieve. This storage method has exacerbated some of the damage now present, not least the loss of velvet pile and the abrasion of the metal wrapped embroidery threads. As part of the larger conservation project, the parish council have purchased a well-specified and museum standard metal cabinet to improve security and improve their control of the storage environment and access to their key treasure.

Its existence is made even more exceptional in that it continues to be a working object in a Church setting, remaining in the same location it has been in since its early use: it remains ensconced within a sacred setting. This fact and its large folio format at 555mm high by 381mm wide, its thickness at a chunky 134mm and its subsequent weight, create an object that is extremely vulnerable when combined with its material construction. It is no surprise that there is evidence of at least two repair interventions, where substantial stabilisation of the textblock, structure and the binding has taken place.

Bound in scarlet silk velvet, the complexity and profusion of raised embroidered work is still fresh and impressive, although the exact date of the binding is not known. The binding is composed of red silk velvet embellished with an embroidered design of silver-gilt filé and drawn-wire purls. The embroidery has been achieved by surface couching over parchment templates and into a coarse plain woven linen backing fabric. This method would have provided a solid support for the weight of the metal [8]. The release of past repair stitching along the left outer joint has enabled a view of the reverse of the velvet to reveal the bright yellow thread used for stitching and the linen fabric which has been cut away where there is no decorative embroidery, presumably to reduce bulk.

The binding has a natural hollow [9], with the spine free from the backs of the sections and spine linings, probably to protect the textile and the heavy embroidery from damage during flexing and use. The textblock is sewn on seven double raised supports but only one of each pair of supports is laced into the boards to form the primary board attachment. This economy of constructive strength is not unusual, with crafty binders being the masters of the cut corner in more ways than one, but has certainly contributed to its subsequent deterioration.


Figure 9 (left) and 10 (right). Removing the repair stitching to the left joint ©Victoria Stevens Conservation

This deterioration has resulted in binding repairs of lower quality red velvet, mainly to the board edges and endcap areas, which in terms of appearance are now noticeable and somewhat jarring due to their own deterioration and loss of pile. However, they are skilfully attached in the main, with an unobtrusive approach. An exception is the left joint: this is split, and has been subsequently sewn up, somewhat field-surgically, using a later gold coloured metal thread (Figure 9-10). It is likely that this was undertaken at a later date to the main board edging and endcap repairs.

The use of a variety of textiles throughout is of particular note: there are coarse and sturdy original spine linings of the same canvas type material that supported the embroidery, as well as later bleached cotton joint reinforcements, adhered over the right joint below the textile binding. It is likely that these joint reinforcements were undertaken in the second wave of repair interventions, along with the crude gold stitching to the left joint.

The endbands and endleaves are constructed of rose-pink silk, the latter likely a later interpolation when the Bible was repaired: there is evidence of a marbled paper pastedown on the inside of the board, a feature more in keeping with the likely date of the binding. Whether this was in the first stage of repairs along with the board and endcap repairs or during the second phase with the structural reinforcements with the cotton patches is unclear. The textblock has neat and careful, if out-moded by modern conservation sensibilities, paper repairs in a European paper; it is likely that at the time these were done in the second phase of repairs.

In terms of condition, there are several clues for its use as an object on permanent open display. It is likely to have spent a large proportion of its time stored flat and closed, possibly on a lectern, as the left board is substantially more light damaged and faded than the right. This is also accompanied by a significant loss of the silk pile on the left board. Another indication that the Bible has been consistently available and on open display is the breakdown of stitching along the seam that forms the outer joint between the left board and the spine. In the European tradition, where books are read left to right, this joint is always subject to the most wear. As such, the textile hinge would have been extremely vulnerable to mechanical stresses when the Bible was open and closed or when left open and unsupported for any period of time.

The textblock opens naturally at the printing error in Luke chapter 20, which is the main bibliographical attraction of this particular edition. This has formed a weakness at that point, and one that if left unsupported could lead to further structural issues. The silk textile faced endpapers, being extensively deteriorated and insubstantially supported by their paper backing, are not performing well, with extensive splits and cracking to where they have been folded back. However, despite its ample proportions and its inherent fragility, the binding has performed its task of protecting the textblock well. The cleanness and completeness of the leaves indicate a text of limited regular use, intended for show and to impress as part of the church furniture rather than as a reading copy for the sermon every Sunday.

Church environments are not conducive to the long term preservation of organic objects. Fluctuating temperature and humidity are difficult to control and take their toll. The slight musty odour that can be detected when working closely with the Bible hints at its usual environment. In the past two years an appraisal of the environment in the church has been undertaken using a datalogger to monitor the environment. Unsurprisingly, the relative humidity levels were consistently above 70%. No mould has been detected on the surface of any component in the Bible, but the high humidity levels are a factor in determining the most appropriate conservation treatment of it.

The fluctuating environment also in part explain the deterioration of the silk fibres used to couch the silver gilt thread in place, the curling of the parchment around which the metal wrapped threads have been worked, and the unravelling of the silver gilt strips where the silk core thread has expanded and pushed through. This highlights the interrelation between materials and their individual responses to each other as well as changes to the surrounding environment.

One of the main lines of defence in the Bible's protection against the potential risks of open display and storage in the church setting will be the support of the church custodians. The need to ensure continuity of care and to engender an awareness of the specific associated risks will be an important element in the ongoing preservation of the Bible. The interrelation between the Bible and the various material components, the church environment, and the parishioners support and active involvement will need to be finely balanced.

The continued location of the Bible in an uncontrolled environment poses challenges for its conservation and ongoing preservation. The main issues concerning the ongoing care of the textile binding can be divided according to those that can be resolved by preventive measures and those that require interventive conservation treatment. An object that is required for continual use and study will require specific support to prevent damage occurring from such issues as inappropriate handling, and the Bible is no exception to this.

Its weight, size and vulnerable embroidered decorations are factors that will need to be addressed by its storage container which can also support its transition from storage to display. The provision of a bespoke padded box to protect the vulnerable textile bindings will be an important aspect of this support. The storage container will also need to provide a level of protection against the uncontrolled church environment. Training and instruction will also need to be supplied for those who continue to look after the Bible to prevent damage from inappropriate handling or a misunderstanding of environmental factors.

Like the relationship between custodian and object, the collaboration of book and textile conservator is a natural and interesting one, with the former concerned primarily with the musculoskeletal elements of the book and the latter with its beautiful skin. However, one of the main advantages of collaborative working between these two disciplines is a familiarity with complex objects and the challenges they pose; whether it is the wide variety of material types encountered and the complicated interrelation that exists between them, or the awkwardness of size, construction, or the object's three dimensional nature.

A shared haptic knowledge, understanding of heritage environments and breadth of conservation practise can help to ensure an informed and nuanced approach. The selection of the most appropriate treatments depends on a number of different factors, but an understanding of the techniques and materials used by other conservation disciplines can inform ethical and practical treatment decisions. An object provides clues as to how it should be treated and detailed examination hones options through careful consideration. Taking account of the wider issues of display and storage as well as the resources available to a client also informs this process. The Bible has provided such parameters and considerations that will determine its conservation treatment.

Coordinating the requirements of each conservation discipline and at the correct stage for the smooth progression of the project without extensive inter-studio transport and unnecessary and potentially damaging handling has been one of the greatest challenges, and learning opportunities. Likewise, securing multi-agency permissions for the work to take place was a factor that was definitely not fully appreciated at the start of the project. This, combined with the restrictions of the Covid-19 lockdown, have made this a project where flexibility and adaptability in approach are key.

Instead of having several months to complete the project prior to the Spring Forum, the conservation is taking place during this time. In terms of interventions, only the partial reinforcement of the structure has taken place. Old, low quality degraded linings have been replaced with new linings of kozo fibre Japanese paper and linen braids attached to the existing cord supports by stitching, a mechanical rather than an adhesive method of support common to both textile and book conservators, to consolidate the sewing structure. Transverse unbleached cotton linings complete the spine support and the board attachment. These secure the boards from damaging vertical movement which may weaken the textile cover and lead to further deterioration of the conserved binding.

At the time of writing, the treatment of the textile bindings had not yet commenced, and treatment methodologies were being trialled. In terms of interventive treatments, the main issues for the textile bindings fall into three categories. Firstly, the structural damage caused by abrasion during use and storage as evidenced by the splits in the velvet fabric on the spine and the curling of the parchment templates exposed by the loss of silver gilt threads. Secondly, the inherent mechanical stress and tension associated with the use of the book as evidenced by the split in the seam at the front left joint, the abrasion to the edges of the boards and damage to the silk endleaves. And finally the issues surrounding failing past repairs which have been weakened over time such as the damaged and splitting endcaps.

The selection of the most appropriate treatments to support the damage as categorised above depends on a number of different factors, but an understanding of the techniques and materials used by other conservation disciplines can inform ethical and practical

treatment decisions. This dual relationship and collaboration will enable the broadest range of knowledge and experience to be utilised and to provide the required combined subtlety and robustness in the approach to its treatment. Working together is a welcome learning experience and development opportunity.

The need to provide functionality for the Bible is an important element in its conservation and will require robust support along the front left join. The release of the past repair stitching along this edge revealed that the textile bindings have been well adhered in place and these adhesive bonds remain strong. The possibility of removing them from their substructure to aid support and treatment of the spine was not an option. The risks of trying to release them even if this had been possible or desirable far outweighed any benefits removal may provide in supporting the textile elements. However, the very edge of the velvet on the left board is extremely weak, evidenced by the splits that have occurred in this area (Figure 11). It is apparent that this needs its own support to stabilise before further work to re-join and strengthen the seam with the spine can be achieved.

Figure 11. Reverse of velvet binding on left board showing the cut linen fabric and yellow couching stitches, as well as the structural repairs in progress ©Elm Heritage Conservation

The choice to treat this damage with the application of stitching poses issues with the potential tension placed on the weak velvet fabric by conservation stitching and threads when the bindings flex during use. The amount of stitching required to ensure an effective support along this edge would also be extremely visible. An adhesive treatment would therefore provide the most suitable means of applying support along this edge with the possible addition of stitching to provide the most effective support. Those who are apprehensive about the use of adhesives in relation to textiles share concerns about the loss of evidence, ease of reversibility in the future and the potential for further damage by altering their nature and flexibility. However, the fact that the bindings have been adhered to the boards would add further weight to the decision to choose an adhesive to apply an appropriate support.

Again, the interrelation between what is suitable for the textile bindings and its interactions with other components of the Bible and the environment in which it is to be kept come into play is crucial when choosing an appropriate conservation adhesive. Factors that will determine the final choice and outcome will include an adhesive that is not impacted unduly by fluctuating environmental conditions. It will not be possible to apply a wet adhesive

directly onto the textile because its position means it would be extremely noticeable if soil migration resulted or dyes were to become unstable. Undoubtedly a mark would result at the interface between the well adhered binding and the loose binding. Reactivating an adhesive using humidification would also not be possible for the same reasons and the difficulty in isolating the area to be treated from the board beneath. This may rule out the possible use of Japanese paper as a substrate and support for the velvet as this is reactivated by the application of water alone [10].

The application of heat to activate an adhesive is not appropriate for the textile bindings for several reasons – the reverse is not flat due to the embroidery threads and the velvet is relatively thick, meaning heat may not transmit well. Also, excessive heat and the application of pressure required to create effective adhesive bonds could unduly impact the silk ground and remaining silk pile [11]. Finally, the three-dimensional nature of the areas and the embroidered decoration will impede sufficient access for the application of heat.

The need to expose the Bible and its binding to minimal stress is key to its treatment. The ease of control of the application of an adhesive support and bonding strength are important considerations. A literature review reveals that silk crepeline has performed well as carrier for an adhesive as it conforms to the uneven surface of the embroidery and can be dyed to colour match the bindings, although visual appearance is less of a consideration as there will not be gaps between splits [12]. A combination of experience, empirical testing and the limitations of the Bible itself will inform the final decision.

Conclusion

By combining shared skills and different approaches with the individual requirements of the range of materials that make up a textile binding and the functions they are tasked to perform in this open access object, the conservation of the Vinegar Bible has created many excellent opportunities. This includes learning different approaches to conserving shared materials, appreciating how the structure needs to relate to the decorative textile cover and making allowances for each discipline's requirements in terms of access and flexibility.

It also has presented a great opportunity to understand the administrative processes necessary to secure the work on the project, made all the more time consuming by events in the wider world beyond the small village of Avington. Finally, it presented an opportunity to work with the client and incorporate their requirements for the storage and use of this magnificent object, with the conservation interventions supporting their responsibilities to ensure their material heritage survives another three hundred years for the parish and its visitors to enjoy.

The conservation project and the proposed storage and preservation solutions for the Bible are far from being a 'basketful of errors' but more a box of delights.

Notes

[1] https://digital.bodleian.ox.ac.uk/objects/e3609380-b56e-4bde-9636-85736559db52/

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CHALLENGES OF OBJECTS ON OPEN DISPLAY & SPRING FORUM CONCLUSIONS

Session Four

The Ubiquitous Eyemat® Floor Covering

Christine Sitwell ACR, *Retired Adviser on the Conservation of Historic Interiors, National Trust*

For many historic houses, the perennial problem of protecting original floor surfaces and historic carpets from the annual footfall of visitors is a major problem. Traditionally, carpet druggets and stanchions have been used to protect carpets and keep visitors to a particular path within a room. The druggets were generally a plain colour which clearly delineated the visitor's path through the room (Figure 1). Woven reproductions as supplied by Axminster of Devon have also been used as druggets to protect the original carpet while allowing the visitor to see the original pattern.

In recent years such methods are seen as a barrier to visitor enjoyment. This desire to increase visitor enjoyment by allowing free range access has created several problems. Many carpets are original and can be in a fragile condition which precludes visitor access. Allowing greater access also increases the daily cleaning regime and causes increased wear and tear on reproduction carpets which are often seen as sacrificial, but their replacement can be a substantial cost. Removing fragile carpets to allow access requires their storage and many houses simply do not have extra storage areas. Carpets can be rolled up at one end of the room to allow limited access, but this may cause long term damage to the carpet.

Figure 1. Oxburgh Hall (National Trust) drugget ©National Trust/NT Textile Conservation Studio

This desire to make collections accessible by covering up or removing original carpets overlooks the importance of carpets in historic settings. Carpets are often viewed as "window dressing" within the room which diminishes their original status as high valued, decorative objects. Robert Adams, the great 18th century architect, created carpet designs which mirrored his painted, decorative plasterwork ceilings. William Morris, a founder of

the Arts and Crafts movement, had a personal collection of Turkish and Persian rugs which he used as inspiration for his carpet designs. He viewed carpets as an integral part of any decorative scheme. Just as a painting is admired for the subtle use of layers of paint and glazes to create the final appearance of the painting, the creation of a carpet also reflects craftsmanship and skill which creates its final appearance, a fundamental aspect of its appearance.

To resolve this issue of access versus the display and protection of original carpets and other surfaces, is the introduction of Eyemats® which create a photographic image of the original carpet or surface (wooden floors, marble and stone floors). One early factor which may have encouraged the consideration of Eyemats® was the use of photographic reproductions printed on cloth during filming. As more and more historic houses were used for filming, the issue of protecting carpets became paramount as their temporary removal was not always possible. However, they were not designed for permanent use but they may have influenced the decision to consider Eyemats®.

What Is an Eyemat®?

According to the manufacturer's brochure[1], the Eyemat® is made of a knitted polyester surface bonded to a nitrile rubber backing (Figure 2). Sectional digital images of the floor or carpet are taken. A rectified colour photographic image of the underlying floor or carpet is printed onto the surface of the mat. A dye-sublimation ink technique is used to print the image. Trial samples are provided to ensure that the size and colour rendering are accurate. Individual sections of the Eyemat® are stitched together.

Figure 2. Eyemat® showing nitrile backing ©Christine Sitwell

Preparation and involvement of house staff during the photographing of the original carpet can involve cleaning the carpet to a suitable standard and removing any furniture to allow

full access. The amount of staff time and fitting the photographing of the original surface into the opening times for the property needs to be factored into the process. The total cost for photographing the original carpet and the production time will vary depending upon the size of the carpet.

Considerations when Laying the Eyemat®

Laying the Eyemat® directly on an original floor surface or carpet can create problems. It has been noted that on marble floors, the nitrile backing can leave dark marks or streaks which can be difficult to remove. In addition, a micro-climate may be created between the Eyemat® and the underlying surface unless there is sufficient airflow. Salt efflorescence on stone or marble floors can result from direct floor contact, presence of moisture through floor and lack of air circulation. To avoid these problems, various types of underlay have been used – 5mm polyester needle felt, polyester wadding or one made of hair/jute.

However, the lack of an underlay or the underlay itself can cause additional problems as the Eyemat®creeps or creases with increasing visitor footfall. This is particularly noticeable in Entrance Halls where the Eyemat® is designed in a long run or where there is a large Eyemat®, for example, in a Dining Room. The creeping of the mat can cause the formation of ridges in the mat which are very noticeable and diminishes the effectiveness of the illusion that one is walking on an actual carpet. Non-slip plastic mesh underlay or a non-slip rug pad can be used to reduce creep. The Eyemat® can also be restrained by a wooden batten at the ends or around the edges. However, this requires drilling through original floorboards to fix the battens in place. Unfortunately, this can also become a trip hazard as visitors often fail to notice them as they enter the room.

In a few instances, the odour of the nitrile backing on the carpet has lingered for several days. In 2017, the National Trust decided to undertake the 'Oddy Test' on the Eyemat® to test for the emission of acidic gasses which might affect lead, silver or copper objects in the same room. The tests were negative for lead and silver, but for copper it was only suitable for temporary use. However, the Oddy Test is primarily used for testing materials in display cases or storage areas where there is a relatively small, enclosed area. It was decided that in the historic room, the level of air exchange and the likelihood of direct contact with a copper object would be minimal.

Visual Appearance and Sound of the Eyemat®

The photographic quality of the Eyemat® is very good as it not only captures the colour, the three-dimensional appearance and clarity or definition of the carpet or floor covering, but also records any wear and tear, slight discolouration or aged appearance. Where the carpet has been damaged or is missing, computer graphics can be used to infill the missing or damaged section. The early Eyemats® were not without problems as some of the mats had a slight shine giving a plastic like appearance. This has been rectified and most visitors when questioned state that they are unaware that they are walking on a reproduction. Another early problem was the sound of the Eyemat® as it was walked upon as it was slightly squeaky or plastic sounding, but this has also been corrected.

Although the photographic image captures the three dimensional quality of the relatively flat surface of the carpet, it is less successful in recreating the visual thickness of braiding or carpet fringes. It is also less successful in imitating the depth or irregularity of floorboards (Figure 3). This is a challenge as historic floorboards present an uneven surface and there is a certain delight in walking across an old floor. Again, sound can be important as some floorboards creak under footfall. Sound is an essential factor in an historic environment as it provides a sense of age or modernity and should be part of overall visitor experience. Some historic houses promote the use of natural smells and sounds by using flowers, potpourri, floor polish and even baking in the kitchen areas to contribute to the atmosphere of the room.

Figure 3. Eyemat® showing floorboard reproduction ©Christine Sitwell

The other sensory aspect which is difficult for the Eyemat® to recreate is the feel of walking on different carpets. Carpets vary in thickness and weave and capturing the plush of the carpet or the hardness of a tightly woven carpet is difficult to replicate. The type of underlay might help to recreate the appropriate feel.

Care and Cleaning of the Eyemat®

The manufacturers provide a care guidance leaflet[2] and have divided the guidance into three types of soiling. The first is dry soiling which consists of the normal types of dust and dirt that one expects in an historic environment. These include sand or grit, dry and wet soil, human skin and clothing fibres. The second type is oil-based soiling which consists of oil or grease, predominantly from cars but it can also come from foodstuffs. The final category is accidental spillage from drinks and foodstuffs, but this should not be a problem for historic

houses as visitors are not permitted to eat or drink in the house. However, during functions where food and drink is permitted, this is a problem.

This care routine emphasises the need for daily vacuuming with suction only vacuum cleaners to remove dry soiling. Stains can be removed using a neutral spotting detergent. Washing can be undertaken *in situ* by using warm water, a soft nylon brush and a small amount of detergent. They recommend that after cleaning, the Eyemat® should be hosed or rinsed down with cold water and left to dry.

Based on National Trust experience, a number of issues have been noted with regard to the level of dust/dirt retention of the Eyemats® compared to traditional carpets and how that has impacted upon the cleaning regime. With the traditional carpet, dust, dirt and other particulate matter collects in the fibres and is retained within the carpet whereas with the Eyemat® the smooth surface prevents their retention and the particulate matter can be dispersed further into the room or adjoining room as visitors walk on the mat. The daily hoovering of the traditional carpet collects the dust/dirt from a confined area whereas the dust/dirt on the mat is spread more widely, therefore increasing the cleaning time regime.

It has also been noted that the Eyemats® develop a slight haze or grubbiness with time. Although the cause of the change in appearance has not been researched, it may be due to the gradual deterioration of the surface layer which allows fine particulate matter to become firmly embedded, and therefore not easily removed by vacuuming or localised washing.

The manufacturers have stated that the Eyemat® can be washed *in situ*, but the methodology is not appropriate in a historic environment. Instead, stains and marks can be removed with localised cleaning with a damp microfibre cloth. Some properties have used 'baby wipes' but these are not appropriate as they leave a residue on the surface which attracts dust, and they are not environmentally friendly. Ksynia Marko, former National Trust Textile Conservation Adviser, and Glyn Charnock of Chameleon Cleaning and Historic Carpet Care are currently undertaking wet cleaning trials on Eyemat® samples to assess the effectiveness and safety of different cleaning materials to be used in situ. If the mat requires substantial cleaning, it is recommended that the mat is removed from the house and cleaned by an approved commercial cleaning company.

The Longevity of Eyemats®

According to the manufacturer's brochure, Eyemats® should last at least five years under normal circumstances. In reality, wear and tear in a historic house can vary significantly and the location and size of the mat contributes to their longevity or deterioration. Mats in entrance halls take the brunt of wear and tear, whereas mats in rooms furthest from the entrance remain in relatively good condition. This is fairly obvious in terms of the deposit of particulate matter as National Trust studies related to dust show that dust levels fall off as visitors venture through the house. Visitors can now use hand propelled wheelchairs, motorised wheelchairs and pushchairs in some properties, particularly those which have lifts to allow access to the second floor. The increased weight on the mat and movement of the wheels has been known to cause physical damage and increase the creep and creasing

or rucking of the mat. If the wheels of the various vehicles are not thoroughly cleaned, they can mark the mats. They also cause stress on the seams, often opening them between the different sections. Although the dye colours are generally stable, there is one known instance where the colours faded significantly. There does appear to be increased dullness of the surface over time which detracts from their visual appearance. To date the longevity of Eyemats® in historic houses has not been tabulated and most comments have been individually reported, particularly where there has been a significant problem.

Other Considerations Related to Eyemats®

There is no doubt that Eyemats® have become a popular alternative to druggets as they allow greater access to the collections in historic houses (Figure 4). Visitors can move freely around the room viewing objects more closely as opposed to being confined at a distance by druggets and stanchions. However, this freer access may increase accidental damage to objects as visitors may be tempted to touch them out of natural curiosity or they may brush up against fragile surfaces, particularly gilded surfaces on furniture. There is also the possibility of theft, particularly in a crowded room.

Figure 4. Eyemat® at Blickling Hall (NT) allowing greater visitor access ©Kenny Gray/NT

Some properties are faced with the dilemma related to access and storage of carpets if they are removed to allow the installation of the Eyemat®. As mentioned previously, storage can be a major issue as most houses have limited storage and removing the carpet to the storage area can be difficult as they are heavy, awkward objects. Storage areas are often located on the upper floors or in basements, making the logistics of simply moving and handling them up or down staircases a challenge. Their removal also limits their access for scholarly study. Carpets in the National Trust and other historic houses are often unique and

limited access reduces the opportunities to increase the understanding of the materials, craftsmanship, design, and history of carpets.

In some instances, the sheer size of the carpet makes their removal impossible and the carpet is left in the room basically serving as an underlay to the Eyemat®. This can have a damaging effect on the carpet as the weight of visitors compacts the plush. It also restricts the ability to examine the carpet's condition for wear and tear and insect infestation. This, of course, applies mainly to the use of a large Eyemat covering the majority area of the carpet. However, even for smaller mats, the logistics of removing it to allow examination of the underlying carpet can involve removing furniture and although the weight of the mat may be less than that of the carpet, it is still a considerable weight and requires storing the Eyemat® within the limited space of the room.

The cost of the Eyemat® will vary depending upon its size but it becomes a consideration if the mat has to be replaced after five years. The original photographic image is retained which will reduce the cost, but the manufacturing cost can still be considerable. It should be noted that the retention of the original photographic images by the manufacturer as well as the property does provide good documentation of the condition of the carpet at the time of commissioning the Eyemat®.

If the Eyemat® remains in good structural condition but is soiled or stained and requires professionally cleaning off site, the cost has been estimated between £2,000 and £3,000. These additional costs need to be factored into the projected property budget. Obviously, with druggets or other types of protective coverings, there would be maintenance or replacement costs, but they would be considerably less.

Other Options using Digital Photography

There is another carpet option which has been trialled in National Trust properties and is proving successful in matching the photographic quality of the Eyemat® [3]. Rutters©, a carpet manufacturer based near Cambridge, can provide digital reproduction carpet druggets similar to Eyemat® in that the carpet is photographed in sections but printed onto a woven, tufted construction as opposed to a flat surface (Figure 5). The pile fibres consist of two types of polyamide on a polyester non-woven primary backing and a secondary backing of jute. Latex rubber is the adhesive used to adhere the two backings and individual sections are joined using a wax tape. A suitable underlay such as polyester needlefelt, polyester wadding or one made of a mixture of hair and jute is required. There is an initial off gassing from the latex backing which disappears after two or three weeks.

As the Rutters© carpet is constructed from a woven, tufted material, it recreates the feel of walking on a natural pile carpet. In addition, it does not creep or crease under footfall thus eliminating the need for physical restraint. Initial tests have shown that it is robust under heavy foot traffic and can be vacuumed in the same way as an original carpet. The colour matching of the carpet is not as precise as with the Eyemat® but the colour difference helps the visitor to differentiate between the reproduction and the original thus keeping the visitor on the drugget as opposed to walking on the historic carpet (personal correspondence note).

Figure 5. NT Felbrigg Hall original carpet (top) with Rutters© reproduction carpet (bottom) ©Ksynia Marko

Conclusion

When a new product becomes popular there is often the tendency to have it everywhere hence the title of my paper, "The Ubiquitous Eyemat®". This is not to diminish the advantages of the Eyemat® but rather to highlight some of the issues and reflect on what its impact has been in the historic interior. Having presented the issues related to cost, installation and considerations of underlay, creep and crease under footfall, storage of original carpets and loss of monitoring for wear and tear and access, care and maintenance and future replacement costs, what has been the aesthetic impact and the visitor experience?

The loss of the opportunity to view an original carpet is a fundamental issue when the Eyemat® completely covers or replaces the original. Carpets have been an essential design element in historic interiors since they were first introduced. One only has to look at a Tudor painting to see how important they were as either a beautiful floor covering, or a decorative feature placed over tables. While it is possible to retain the image of the carpet by means of an Eyemat®, the original craftsmanship, texture and feel is lost. This may not be a significant factor for many visitors and often they do not realise they are walking on a reproduction, but for those visitors who want to admire a carpet, the experience is diminished.

Allowing visitors greater access to collections is important but it has been noted that the visitor now tends to focus on objects above floor level and may fail to notice the significance of the carpet. The National Trust will be undertaking a more detailed study of the use of Eyemats® in its properties to address these questions and also assess the issues around their care and maintenance and long-term stability.

The purpose of this paper has been to broaden the discussion around Eyemats® and to consider where their use is appropriate as well as introducing other alternatives such as the Rutters© carpet and Axminster replicas.

Acknowledgements

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Notes

[1] http://eyemats.co.uk/eyemats%20Conservation%20Flooring%20Brochure.pdf
[2] Provided from Eyemats® upon request
[3] Personal communication with Ksynia Marko, former National Trust Textile Conservation Adviser

Having a (Moth) Ball. The Newhailes House IPM Project

Arielle Juler, *Freelance Preventive Conservator, Project Team Leader for Newhailes House moth project*

Introduction

An increase of webbing clothes moths (*Tineola bisselliella*) numbers at Newhailes House required the formation of a project team to tackle the problem through three activity strands: temporarily decanting the collection from the affected rooms, low temperature treatment of affected and vulnerable collection items and a thorough deep clean and selective application of pesticides to the affected spaces. The scale of the project necessitated the recruitment of volunteers and the secondment of non-specialist staff to ensure delivery of the core objectives. The core project team received '*Train the trainer*' instruction to enable the entire team to take an active part in training of volunteers and non-collections staff.

This paper will discuss the '*Train the Trainer*' approach used by the Trust to establish the Newhailes moth project team and create training packages to use on-site with volunteers and non-specialist staff. It will also discuss the difficulty in tackling a large scale IPM project in an historic interior with rooms of mixed material on permanent open display. The paper will also review the outcomes of the project as well as the positives and negatives of the methodology and lessons learned.

History of Newhailes House and Gardens

Newhailes House is a Palladian villa built in 1686 by Sir David Dalrymple, 1st Baronet of Hailes. The house and estate were owned by the Dalrymple family continuously through to the last descendants of the house in the 20th century, Sir Mark Dalrymple, 3rd Baronet and his wife Lady Antonia. The couple had no children and when Sir Mark died in 1971 the Baronetcy became extinct. Lady Antonia moved to an apartment in the attic of the house in the early 1980s and eventually moved to a smaller cottage on the estate in 2011. Lady Antonia died in 2017 at the age of 91, ending 300 years of the Dalrymple family at Newhailes House (Wikipedia 2020).

In 1997 Lady Antonia gave the house and estate to the National Trust for Scotland as the cost of upkeep was difficult to manage and the house was in danger of falling into disrepair. The bequest included all of the contents of the house comprising a collection including paintings, furniture, ceramics, historic textiles and costumes, and all the family ephemera gathered over the preceding generations.

The conservation policy adopted by the Trust on acquisition was to do 'as much as is necessary, but as little as possible' to maintain the authenticity of place and sense of the history of use of the historic interiors. The majority of the collection, therefore, remained on permanent open display within the state rooms on the first and second floors. A few rooms

in the basement were converted to storage with rooms in the attic apartment also containing collection items on long term storage (Figure 1).

Figure 1. Newhailes House © National Trust for Scotland

Project Background

Integrated Pest Management (IPM) is employed by the National Trust for Scotland (NTS) across the historic properties in their care. Quarterly pest numbers are analysed and reported on yearly to provide a picture of where pests are active and act as a warning system for when numbers begin to increase.

At Newhailes House IPM data indicated a sharp rise in webbing clothes moths (*Tineola bisselliella*) in the annual IPM report for 2016 with numbers increasing from 25 in 2015 to 132 in 2016, an increase of 428%. NTS property staff acted quickly to increase housekeeping hours and carried out freezer treatments on particularly vulnerable items. The IPM report in 2017 duly indicated the approach was working with moth numbers falling to 80. However, in 2018 webbing clothes moth numbers were on the rise again with 147 logged in pest traps, an increase of 84% from the previous year (Juler 2019) (Figure 2).

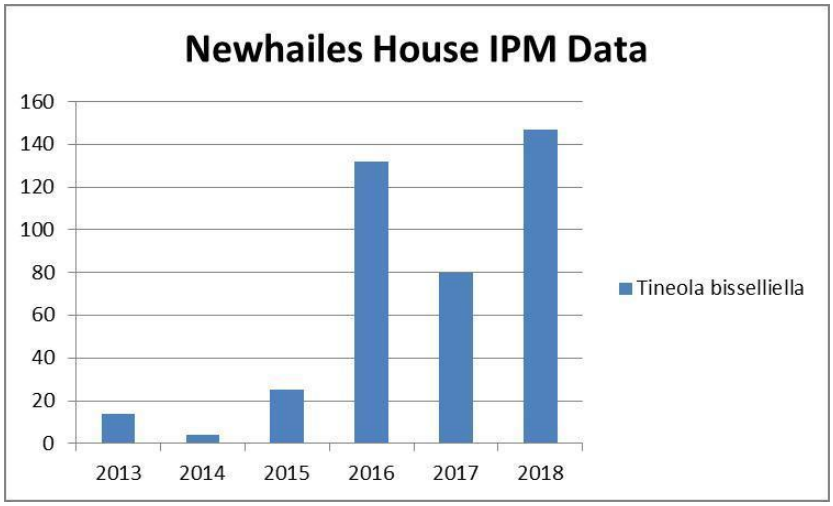

Figure 2. IPM data for webbing clothes moth at Newhailes House 2013-2018 © National Trust for Scotland

The regional conservator and national preventive conservator decided a more interventive approach was needed to tackle the causes of the webbing clothes moth infestation and freezer treat vulnerable items that are on permanent public display. The project plan was formed to carry out three main activity strands simultaneously in the house:

- Wrapping and packing collection items and temporary decant to storage
- Low temperature treatment of vulnerable and affected collection items with two on-site freezers
- Cleaning affected collection items and application of preventative pesticides to affected rooms

In order to deliver the activity strands within the timeframe a project team structure was created to have three on site project team leaders deliver the activity strands supported by a larger project team of volunteers and non-specialist staff.

Train the Trainer

The Trust decided to implement the '*Train the Trainer*' method to prepare the project team leaders for working with volunteers, delivering a training day and in depth onsite training. The methodology for '*Train the Trainer*' is to provide the project team leaders with trainer and facilitator instruction to enable the project team leaders to convey their specialist knowledge to the wider project team of volunteers and non-specialist staff (Houston 2019).

The project team attended an in depth training day with an external facilitator to gain an understanding of different learning styles, learner motivations, how to create learning experiences and how to deal with conflict in the learning environment. The session offered the project team opportunities to practice learning scenarios, discuss ideas for training packages and practice public speaking (Bowie 2019).

The project team focused on how to deliver training that would prepare volunteers and non-specialist staff for undertaking a large IPM project. The team divided the essential elements to each of the three key activity strands into training modules:

- An overview of Integrated Pest Management and treatment options
- Documentation requirements – recording object movement and freezer treatment
- Safely moving collection items either to temporary storage or for onsite freezer treatments
- Preparing collection items for freezer treatments or temporary storage
- Basics of surface cleaning for collection objects.

Within the training modules, the project team was able to break down the project activities further to create training activities which offered a variety of learning experiences the project team could deliver to the volunteers and non-specialist staff.

- Handling and moving objects safely
- Wrapping objects in acid free tissue
- Packing and sealing objects in plastic sheeting
- Surface cleaning objects with brushes, cloths and variable suction vacuum
- Completing documentation forms with object information.

Using the methodology from '*Train the Trainer*' the project team decided to create a half day training session to offer all volunteers and staff taster sessions on the different project elements with further training once the project began onsite.

Induction Day

Following the *'Train the Trainer'* session, the project team worked together to develop learning packages that formed an 'Induction Day' for all project volunteers and non-specialist staff to attend. Incorporating the methodologies gained from *'Train the Trainer'* session, the project team devised different learning experiences that would provide volunteers and staff an opportunity to gain an understanding of the project remit and requirements and experience the physical tasks involved in the IPM activity.

The induction day was scheduled for two half day sessions, in order to accommodate all volunteers and non-specialist staff and still offer a small group learning environment. The training packages included a project introduction, short talks on collections care and conservation cleaning, group activities, an IPM overview and a property tour. Hands-on activities included practice moving objects, surface cleaning with a variety of brushes, vacuum and cloths, and wrapping objects in plastic sheeting (Figure 3-4).

Figure 3 (left). Induction Day , lecture on surface cleaning © National Trust for Scotland.

Figure 4 (right). Induction Day, discussing how to move a test object with volunteers © National Trust for Scotland.

The project volunteers and non-specialist staff were split into small groups of 3-4 to practice the hands-on activities throughout the induction session. The small groups were asked to practice the project tasks such as moving objects across the learning environment or wrapping objects in plastic sheets with the overview of the project team leaders. By working in small groups the volunteers and non-specialist staff were able to discuss the project tasks and plan their actions together. If a group was unsure of the procedure or methodology, the project team leaders were on hand to offer additional guidance and instruction.

The induction sessions ended with a frank discussion of the large scale of the project and the physical nature of some of the project activities. The project volunteers and non-specialist staff were given an opportunity to ask questions and were asked to complete sign up forms to confirm their interest in the project and availability for scheduling.

Working Onsite

The project began on site in January 2019 with additional onsite training days planned to allow the project team to increase skills and confidence with the project activities and working within the historic interior. The project team leaders worked with small groups of 2-3 volunteers and non-specialist staff to provide additional hands-on training and support during the early stages of the project. It was important that all of the volunteers and non-specialist staff felt comfortable working with the objects and the team leaders were available onsite for questions and additional support.

The project team leaders needed to train the volunteers and staff on how to deliver the key project activities within the historic environment, often using the historic spaces and collection for training activities. For example, the project team leaders used items of furniture from the collection to practice wrapping and packing techniques with volunteers and non-specialist staff. The objects chosen were assessed ahead of the training to ensure they were stable and robust enough for manual handling and repeated wrapping sessions to

allow volunteers opportunities to practice the project methodology (Figure 5). Onsite training continued during the early stages of the project as volunteers and non-specialist staff started working within the historic interiors on different dates. The project team wanted to ensure everyone started the project with an induction and additional hands-on training to help increase their skill levels and confidence with the project tasks.

Figure 5. Onsite volunteer training, wrapping furniture © National Trust for Scotland

Additionally, the accumulated layers of collection on permanent open display within the historic interiors of Newhailes House created a challenging working environment. A large number of collection items needed to be wrapped, packed and temporarily decanted to designated storage areas within the house in order to access materials requiring freezer treatment. Often this included fragile items which required the project team to slow progress to ensure the volunteers and non-specialist staff were able to safely follow the project methodology for wrapping, packing and moving the collection.

For instance, the Library contained a number of large ceramics on open display which needed to be relocated to storage before the project team could wrap, pack, and move furniture and textiles for freezer treatments. Even once the ceramics were packed, the project team was faced with the task of wrapping and packing 12 layers of historic carpets which the family had overlaid on top of each other over the years – requiring a group effort from the project team! (Figure 6).

Figure 6. Project team rolling large carpet for freezer treatment © National Trust for Scotland

Once these preparatory tasks were underway, the project team was able to split the volunteers and staff into small groups of 2-3 in order to deliver the project activities across all four floors of the house simultaneously. As rooms were cleared of the collection, deep cleaning and pesticide application could begin in small teams while other teams started the task of wrapping, packing, and moving collection items from another room. As the project progressed, the skill level and confidence of the project team increased and tasks became easier to complete. Volunteers and staff who were involved from the beginning of the project took on a more active role in assisting team members who joined partway through the project to ensure tasks were completed according to the agreed project methodologies.

Outcomes and Benefits

The main activity strands for the Newhailes moth project concluded onsite in June 2019 with the removal of the two large industrial freezers and disbanding the project volunteers. Returning objects from temporary storage, collection cleaning and enhanced IPM monitoring continued by the property staff in order to complete outstanding tasks and provide additional IPM data for post project analysis.

The project delivered the main objectives for collection and interior treatments: approximately 400 objects were freezer treated and cleaned for webbing clothes moth; 700 objects were wrapped, packed and moved to temporary storage to enable access to affected objects and interiors; and 20 rooms were deep cleaned and pesticides applied to prevent reinfestation of clothes moth.

During the project additional benefits were achieved through completing the activity strands within the house. For example, through packing and relocating collection items for temporary storage, item locations were audited in the course of locating them for either storage or freezer treatment with any errors corrected within the NTS collection database. Additionally, documentation created as part of the project also enabled object files to be updated with condition information and freezer treatment reports. In some instances, the

object documentation was the first occasion the object may have been examined in years due to the difficulty in accessing some areas of the State Rooms and storage areas through the layers of materials on permanent open display.

Collection items also benefited from improved packaging and housing conditions. Items which were tucked away in hard to access cupboards were examined, surface cleaned and rehoused in acid free tissue paper to prevent further accumulations of surface dirt. In some instances, historic costumes were rehoused in archival boxes and relocated to the onsite textile store from their previous storage locations in cupboards and dressers in the house.

NTS used the Newhailes moth project as an opportunity to upskill staff from other properties in IPM principles, treatments and enhanced cleaning procedures through hosting a series of onsite continuing professional development days during the project (Figure 7). Four sessions were held with 20 staff attending from across Scotland to increase their skills and share their knowledge and experience with their own local property staff.

Figure 7. IPM training day for NTS staff © National Trust for Scotland

Challenges and Reflections

Over the course of the project, the team leaders encountered a number of challenges that needed to be worked through in order to deliver the key project activities. The *'Train the Trainer'* methodology provided the team leaders with the skills to facilitate training the project team, however, once the project started onsite training became more difficult to facilitate. The onsite training proved difficult to schedule as volunteers and non-specialist

staff often worked varying hours and days over the course of a week, which required the project team leaders to repeat training sessions a number of times to ensure everyone received the information. The logistics of starting onsite in this manner meant progress was much slower in the early stages of the project than anticipated. Also, some of the volunteers were unable or uncomfortable completing some of the project activities, such as working from height or lifting heavier collection objects. These tasks had to be scheduled when suitable project staff were available which also led to slower progress.

Additionally, the repetitive nature of the project activities (i.e. wrapping dozens of cushions and chairs) meant that the volunteers experienced project fatigue and craved more variety of tasks than were available at certain points in the project. Volunteer numbers declined during the project and the project team did not have the resources to launch an additional recruitment drive, with the result that the project team was depleted in the last phase of the project. Again, progress slowed onsite and some tasks were unfinished when the project 'concluded' in June with property staff needing to help complete unfinished tasks within the house.

Conclusion

The project team met the overall project objectives for collections and interiors treatments while delivering additional benefits for collection care, documentation and NTS staff training while working through challenges in the project. IPM data for Newhailes House indicates that webbing clothes moth numbers were reduced through the project activities (Figure 8). Increased monitoring and housekeeping since project completion has succeeded in repressing the infestation of moths and protecting the historic collection on permanent open display (Juler, 2020).

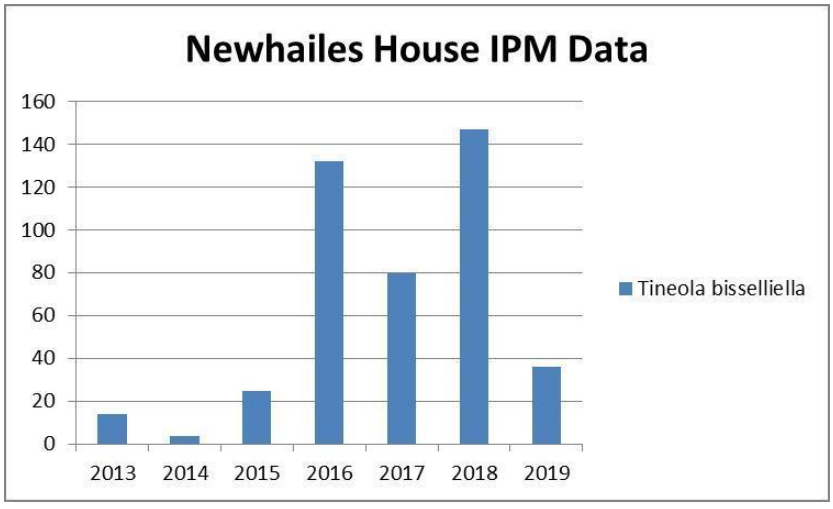

Figure 8. IPM data for webbing clothes moth at Newhailes House 2013-2019 © National Trust for Scotland

The *'Train the Trainer'* model provided project team leaders with the skills, knowledge, and confidence to deliver training to volunteers and non-specialist staff. However, working with

volunteers and non-specialist staff within an historic interior with layers of accumulated collection on permanent open display proved challenging, with the project team often working at a slower pace to maintain the project methodologies.

On reflection, the biggest challenges for the project team were time and resources. A longer period for training and induction onsite built into the project schedule would have benefited the project team and reduced the outstanding tasks left at the end of the official project period. Also, once volunteer numbers began to decrease, an additional volunteer recruitment and training drive would have provided much needed resources at the later stage of the project.

Acknowledgements

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Does Size Matter? The Impact of Open Display on Textiles in Dolls' Houses

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Jane Smith ACR, *Senior Textile Conservator, National Trust Textile Conservation Studio*

Outline

In the National Trust's collection are two of the most important 18th century dolls' houses in Britain, furnished to replicate the grand houses in which they are found, notably Nostell Priory (Figure 1)[1] and Uppark House (Figure 2)[2]. At the beginning of 2020 the National Trust's Textile Conservation Studio treated textiles from these two dolls' houses; all the textiles from Nostell and four state beds and four dressing tables from Uppark.

The textiles included state beds furnished in velvet and silk; dolls' clothes of silk, cotton, linen and lace; embroidered carpets, upholstered furniture and silk curtains trimmed with braid. These houses are a microcosm of a historic house and the conservation challenges found there. Although the contents have, to some extent, been protected from the elements, being a house within a house, the contents were still subject to wear and tear due to handling and the environment of open display. The deterioration mirrored that found in historic interiors.

Figure 1. Nostell Priory's dolls' house after conservation ©National Trust

Figure 2. Uppark dolls' house ©National Trust/Maria Jordan

Introduction

The concept of the miniature house came to England from the Netherlands and Germany in the early 18th century. The term 'baby' house emerged in the early 18th century and refers to the contemporary word for dolls, rather than to the people who used, or played with, these objects. The dolls' house at Uppark, which stands on its original, high base, is almost three metres tall and, as such, would have been far too high for children to reach and play with. It is much more likely that 'baby' houses were the preserve of young women, newly married and in charge of a household, and used by them to learn how a household worked and how a fashionable house should look. The house and its precious contents were also a powerful demonstration, then as now, of a woman's style and her family's wealth and status. Due to their intricate and expensive design, 'baby' houses were not seen as a plaything for children until the early 19th century.

The magnificent Nostell Priory 'baby' house was made in the third quarter of the 18th century, but the exact date of its manufacture and indeed the maker are unknown. However, the architect James Paine (1717-89), who worked at Nostell from 1736, is the most likely designer. The exterior of Nostell's 'baby' house is Palladian in design, very much in the style of Paine's full-scale houses. The Nostell house is widely associated with Susanna Henshaw and Rowland Winn, 4th Baronet; a label once fitted to the floor of the Yellow Bedchamber (top floor, central room) said 'This house was made by Lady Winn and Miss Henshaw'. The Winn/Henshaw connection to the Dolls' House is reinforced by their coat of arms in the pediment.

Meanwhile, the Uppark baby house is believed to date from around 1735 and is also Palladian in style, with the roof's balustrade surmounted by seven classical figures with the central pediment painted with the Lethieullier coat of arms. It came to Uppark in 1746 on the marriage of Sarah Lethieullier to Sir Matthew Fetherstonehaugh.

Exterior

The Nostell house is fronted by a pair of sliding doors whilst on the Uppark house the doors open outwards. The Nostell house has lost its stand whereas at Uppark, it has its original arcaded stand. The doors of both houses incorporate pairs of windows fitted with high quality crown glass but vary on the side elevations; in the Nostell house there are side windows but not on the Uppark house.

Interior

The house interiors are both laid out across three floors, each with three rooms. In both, the room behind the 'front door' is the Entrance Hall, oak panelled, fitted with a staircase and a wooden floor. Either side the rooms are for the functioning of the house; at Uppark there is a Kitchen and a Housekeepers Parlour. At Nostell a Dining Parlour and a Kitchen flank the Entrance Hall.

The middle floor, which constitutes a *'piano nobile'*, represents a sequence of the best rooms in the house, an arrangement seen in many full-size fashionable houses in the 18th century. In the Nostell house, the three rooms are the Drawing Room, the Red Velvet Bedchamber and the Dressing Room. The Bedchamber has a beautiful wooden bed with crimson red velvet hangings, made exactly like a full-sized bed, with a scrolled wooden cornice covered in crimson silk velvet edged with braid (Figure 3). The bed curtains are fitted with tape and rings and hang from a miniature iron compass rod between the tester's inner and outer valances.

Figure 3. Red velvet bed, Nostell's dolls' house ©National Trust/Jane Smith

In the Uppark House, the three rooms are the Drawing Room, the Dining Room and the Best Bedchamber; here the bed is hung in silk damask trimmed with braid, both in pink and cream. This bed echoes that of Nostell with a carved wooden tester and integral curtain rod.

The top floors of both dolls' houses have lower ceilings. They have a more domestic feel with simpler furnishings. In the Nostell house, the three rooms comprise a Dressing Room and two Bedrooms, one of which is furnished as a lying-in room. Both bedrooms have angel beds. These are beds without foot posts where the tester is supported by fixings in the ceiling. One hung with yellow silk, the other with pretty, printed chintz. In the Uppark house, all three top rooms are bedrooms, also containing angel beds. One is hung with cream and yellow silk lampas, trimmed with a red and cream silk woven braid. Another bed is of yellow silk, trimmed with yellow braid and the last in blue silk taffeta with a blue and cream binding braid.

The textiles used in both houses are of the highest quality and appropriate to the object or the doll figures, replicating those used on full-size items. From their cut and stitch work, all three beds in the Nostell house and two in the Uppark house are clearly made by professional upholsterers, in the same way as a full-size bed would have been made. They come complete with ticking mattresses, quilted with tufts of silk, cotton sheets and ticking bolster cushions. The upholstered furniture, some with separate cushions, is of a very high quality made from walnut or bone and upholstered with velvets and silks.

Exceptions to the objects replicating full-size ones are the Red and Gold Bed and the Blue Bed from Uppark. The tester, cornices, headcloth and bases are made from stiffened, sized paper with the silk fabric stitched through the paper. The Red and Gold Bed is particularly interesting as the tester is made from uncoloured and uncut playing cards (Figure 4).

Figure 4. The top of the Red and Gold Bed tester made from playing cards, Uppark dolls' house

There are seven dolls in the Nostell house; lady of the house, nursemaid, child, two ladies, cook and footman (Figure 5). They have dresses displaying tiny, embroidered sprig fabric, printed chintz and fine lace. There are layers of petticoats in cotton or quilted silk and bonnets with ribbon. The figures have wax heads and hands with padded cloth bodies except the cook and footman dolls which are painted wood with linen and wool clothing.

Figure 5. Lady of the House doll, Nostell dolls' house ©National Trust/Jane Smith

In the Uppark house, all the twelve dolls are intricate in their dress, with examples of printed cotton, multiple petticoats, elaborate and sophisticated silk brocades, varied shoes and caps, reflecting contemporary 18th century style of dressing according to status and occupation. In this house, three dolls are made from wax with padded cloth bodies, the gentleman and two ladies, whilst the rest are made of wood, with jointed limbs, painted faces and real hair.

Challenges of Open Display

How have these exquisite textiles fared over the last 250 years? You might think that they have been frozen in time, unaltered in any way, locked away in their treasure houses. However, the impact of the environment and handling during use, play and housekeeping is evident. Past repairs show the damage that occurred but the good condition of most of the textiles suggest a history of care with housekeeping carried out on a miniature scale, encompassing regular cleaning and repair.

In Nostell's dolls' house, the curtains in the Dining Parlour have a patch beautifully stitched in place to repair damage that has been presumably cut away, at an unknown date. On two of the yellow moiré curtains from the Yellow Dressing Room losses have been darned. The brown silk dress on the old lady doll is darned on the sleeve and skirt. A needlework carpet worked in *gros point* and *petit point* has repairs in its blue silk lining. The fit and stitching of the lady of the house's dress is not as finely executed, in contrast to the other dolls' clothes. Perhaps she was redressed by a lady of the house, rather than a professional.

In the Uppark dolls' house, the Best Bed has lines of couching, in a coarse silk thread, on its curtains repairing weakened fabric (Figure 6). We know that these repairs were carried out by Lady Meade-Fetherstonhaugh, after her husband inherited the house in 1930. She was responsible for the preservation of the textiles and furnishings in the grand house and she used the same techniques on the dolls' house curtains. The muslin and lace overskirts of the dressing tables were washed on 10th February 1946, as recorded by a note found in the Best Bedchamber dressing table drawer. They were washed in saponaria, made from the plant *saponaria officinalis* which was boiled up in water, a practice that Lady Meade-Fetherstonhaugh used for many textiles within the main house.

Figure 6. Couching repairs on the bed curtains of the Best Bed carried out by Lady Meade-Fetherstonhaugh, Uppark doll's house ©National Trust/Jane Smith

Textiles are often repurposed and the same is apparent in the dolls' houses. Stitch lines can be seen in the red velvet textiles on the Nostell state bed and at the windows in the Drawing Room. The yellow silk curtains have horizontal fold lines. The gorgeous silks on the Uppark beds are reminiscent of dress fabrics and may be made from off-cuts.

Since coming into the care of the National Trust, the same standards set for the care of a mansion has been applied to the dolls' houses.

From 20th century archival photographs, both dolls' houses can be traced as being kept in a variety of rooms within the mansions. At Uppark, since 1954, when it came into the care of the NT, the dolls' house has been in two locations; between 1954 and 1989 on the ground floor in the Servery, adjacent to the Dining Room, and since 1995 it has been in the

Servant's Hall. It was rescued during the fire of 1989 but anticipating a big rise in visitor numbers on the reopening of the property, which would have threatened the safety of the house, the National Trust decided it should have its own dedicated room, the Steward's Hall in the basement.

The environmental conditions between these two rooms are similar with an average annual relative humidity (RH) of 62.5% for the Servery and 64.8% for the Servant's Hall. Conservation heating is used in the rooms to control any fluctuations and, whilst these are at the upper end of 50-65% target range set by the National Trust, they are nevertheless within the range. The RH is also monitored inside the dolls' house where the readings are lower; in 2020 (with the sensor being moved from room to room each week) the average RH over a two-month period was 54.47%. This is partly due to the buffering of the dolls' house and partly due to the Perspex® covers made for each room and installed before it was redisplayed in 1995.

At Nostell Priory, the dolls' house was moved from the Billiard Room to the Museum Room in 2008 and then to the upstairs Grey Bedroom in 2015. The relative humidity is monitored in all three rooms and a review of the data over the past four years shows that the RH does fluctuate but remains within the target range, albeit at the higher end of the band. Therefore, moving the dolls' house from a lower floor to an upper floor will not have impacted on the textiles. The inside of the dolls' house is not monitored at Nostell but its interior is likely to be buffered in the same way as at Uppark. There is evidence of an alteration to the dolls' house to allow a glass panel to be screwed over the front of the house to protect the contents when the doors were open. This is no longer in place, but the dolls' house has been put inside a glass case. This not only buffers against fluctuations in RH but also helps to reduce the impact of dust.

Condition and Treatment

The miniature textile items have all been subject to use, play, dust, light, temperature and humidity, and their condition reflects those of textiles found in real houses.

Fabrics age in the same way. The cotton and lace overskirts on the dressing table covers from Uppark were discoloured from cellulose degradation. Deterioration due to the ageing and construction of the chintz bed, in the Nostell house, is apparent. The cellulose degradation is particularly noticeable on the cornices where the glue, used to adhere the fabric onto the wood, has exacerbated the yellowing.

Conservation treatment was carried out on a miniature scale, using techniques undertaken on their life-size counterparts, such as surface cleaning, humidification, wet cleaning and support of fragile textiles with both stitched and adhesive techniques. Different approaches to treatment were taken, balancing both the story that these contents tell and their future stability.

Some of the past repairs on textiles in the Nostell house were crudely executed so they were removed before supporting damaged areas in a more sympathetic way. However, because the provenance of the repairs to the Uppark textiles can be attributed to Lady Meade-Fetherstonhaugh these were left and further conservation carried out if needed in

these areas. For example, the curtains of the Blue Bed were pinned in place. It is unclear whether this was an original construction or a holding repair, so the pins were left in place with some stitching to support the sagging fabric. The approach to conserving the dolls' houses was to do the minimal work needed in order to support the fabrics for display. The evolution of the contents is part of their value, so later changes were accepted but made more stable, as needed.

In both houses, dirt and dust were seen particularly on the flat surfaces of the seats of the upholstered chairs, on top of the state bed testers and on coverlets. Dirty lines were seen on window curtains where the fabric was outermost in the folds. Blankets used as carpets were soiled. All textiles were cleaned by vacuuming on low suction, using either with a soft brush and museum vac or a micro-vac for the small details. Cosmetic sponge was used on stronger surfaces to remove further dirt.

In the Nostell House the aprons on four of the dolls, a *trapunto* quilted coverlet, two wool blankets and four silk curtains from the Dining Parlour were wet cleaned. The aprons, due to their fragility, were cleaned on the suction table to avoid them getting too wet.

From the Uppark House, cotton quilted coverlets and a white linen sheet were wet cleaned. A Dehypon LS54® and SCMC® solution with a warm water pre-soak was used. This did improve their appearance, making the white fabric brighter and the staining less apparent. They were blotted and laid flat to air dry, weighted to maintain their original dimensions after drying. The overskirts of the dressing tables were also wet cleaned. The overskirt from the Best Bedchamber had strong brown stains lines perhaps from the saponaria used in the 1946 which had not been adequately rinsed away. These stains were largely removed with wet cleaning.

There is loss of the red velvet pile on the upholstered walnut armchairs in the Drawing Room and the chairs in the bedchamber with red velvet backs. Interestingly, the velvet is worn along the front edge and the top of the back, remarkably similar to wear on larger chairs after use and handling.

A common issue in full-size curtains is seen when curtain linings become too tight due to environmental changes causing stresses in different fabrics. This was seen during the conservation at the Studio of red velvet curtains in the King's Room at Knole and is replicated in miniature in the Nostell dolls' house where the velvet of the dressing room curtains bags as the silk linings have become too tight. Curtain linings are generally very vulnerable to the light. The curtains in the Dining Parlour and Yellow Drawing Room have faded. The fade lines match the size of the windows as would happen in a real-life setting. The silk linings on the red velvet window curtains of the Velvet Dressing Room were very weak and splitting, reminiscent of damage from light and handling full-size curtains as they are opened and closed.

The dressing tables have two layers of textile; an underskirt of quilted silk on three sides with unquilted silk on the top, and an overskirt of fine cotton with lace. The underskirt showed fading suggesting that the overskirts were later additions.

In the Uppark dolls' house fluctuations in humidity had caused the stiffened paper in the two beds to buckle and sag, seen particularly on the Red and Gold Bed which had set in this

distorted position. The mattresses of the two beds fit into the paper bases, however the paper sides were sagging outwards, and the feet had crumpled. The base of the Red and Gold Bed showed some discolouration and evidence of a past mould infestation, with black spotting marks. The distorted paper was humidified to reform the original shape, to prevent creasing of the textiles and subsequent splitting.

The tester, cornices and valances on both beds were reshaped using Sympatex® and damp blotting paper. The Sympatex® allows water vapour through, to gently humidify, but prevents moisture. The structure was pinned into Plastazote® and weights used to encourage the card back into its original shape.

The bases were also humidified but the feet were still liable to curl. Supports were made from thick Nomex®, a stiff nylon paper which is inert and conservation tested, covered with cotton tape. It was stitched behind the foot and through the braid on the bed base to secure it in place. It also now sits on a piece of Plastazote® to raise it, stopping the feet sitting on the floor and potentially crumpling from the weight of the mattress and coverlet.

Bed and window curtains from the dolls' houses were given an adhesive support to secure splits and fragility of the silk, in a similar way to that used on full-size curtains such as Knole's, Spangled Bed and Erddig's State Bed. An adhesive coated dyed silk crepeline support was adhered to the reverse. However, it was fixed with a heated spatula, rather than on a large hot table as used for full-size curtains. Previous darning on one of the yellow curtains from the Yellow Dressing Room in the Nostell house was left in place as it was stable and visually unobtrusive. However, on another curtain the repair stitches were crudely worked in a cotton thread and were no longer holding loose threads, so were removed.

The red velvet curtains in the Dressing Room could not be removed from the dolls' house so were treated in-situ; adhesive crepeline was applied on-site to the fragile silk curtain linings.

The silk curtain fabric on the Best Bed was damaged at the leading edges. These face outwards so are subjected to more light and are more likely to have been handled. The repair couching by Lady Meade-Fetherstonhaugh on the Best Bed in the Uppark house was still secure but extra couching was worked on other areas of the Best Bed that were now failing and splitting.

The braids on the edges of the Uppark dolls' beds were abraded and worn with losses, as seen on many full-size braids. An overlay of colour-matched conservation nylon net was applied to the weakened bed braids from the Uppark house and applied to the dressing table underskirts.

Other textile items from the Uppark dolls' house are waiting to be conserved. All the windows in the Uppark dolls' house are on the front doors, which are displayed open for visitors to view inside. The festoon window curtains, reminiscent of the festoon curtains in the large house, are vulnerable to air currents and fluctuations in humidity and their condition is poor. Some of the curtains were conserved and encased in conservation nylon net in 2006 but continue to degrade, requiring further conservation or to be retired to the store and new curtains substituted. All the other curtains are stable having had extensive laid couching to support them, again by Lady Meade-Fetherstonhaugh.

Unlike the Nostell's dolls which are in good condition, the Uppark dolls are all damaged in some way; either missing arms or legs, with noses and fingers broken, and even a foot detached. This has an impact on the textiles; for example where an arm is missing, the textile is not fully supported. Many of the dolls are 'perched' on chairs and creasing and folds have occurred, which after many decades has resulted in splitting of the fabric. Wear can be seen on sleeves, cuffs, bodices, petticoats and men's coats and their stockings and trimmings have become unravelled and caps are soiled and dislodged. The discrepancy in condition between the two sets of dolls may be due to the Nostell dolls being mounted on stands which provides support and aids handling.

Conclusion

This paper demonstrates that a doll's house faces similar challenges to all textiles on open display and that doll's houses are in fact a microcosm of these grand houses. Of course, the carpets are not walked upon and the beds are not slept in but the textiles show degradation in a similar pattern to those found in a grand house, demonstrating that impact of the environmental conditions is as great as handling and wear and tear. Clearly, in response to our title question, size does not matter with regard to degrading textiles and therefore good housekeeping practices and a stable environment are essential for preserving organic materials. Our forebears have proved that a baby house was indeed an excellent training tool for managing a grand house, but they retain their function today for those of us caring for a historic house.

After 250 years, the challenges of open display and the toll it has taken on the textiles has meant that the National Trust has had to make interventions, using protective covers to help prolong the life of these extraordinary objects. Following the conservation treatment on the Nostell Priory dolls house in 2020, a bespoke case was made to ensure that the textiles will be kept in the best environment to maintain them for many years to come. There are currently discussions around the Uppark dolls house and how to best display it. Whilst we are not able to place a grand house in a protective box, fortunately a dolls house we can!

Acknowledgements

The authors would like to thank all our colleagues at The National Trust Textile Conservation Studio, Felicity Bolton from Knole Conservation Studio, who came to the Textile Studio and worked on the upholstered furniture from The Nostell dolls' house. And colleagues at Nostell Priory and Uppark House, in particular, Sarah Foster, Simon McCormack, Carolien Coon and Melanie Leach.

Notes

[1] Near Wakefield, Yorkshire
[2] Near Petersfield, West Sussex

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Handling a Very Large Historic Carpet during Lockdown

Jonathan Tetley, Textile conservator, *Tetley Workshop Textile Conservation Cleaning Facility*

After successfully completing various procedures involved in removing a very large carpet from a very large room in a well-known castle during lockdown, it seemed worthwhile reviewing not only what was done, but also what was contemplated.

Refurbishment works had been planned to Wyattville's extraordinary and innovative roof that had enclosed the inner court at Windsor Castle to make the Waterloo Chamber in celebration of a new Europe after the defeat of Napoleon. This room not only houses Sir Thomas Lawrence's numerous portraits of the victors but also a really beautiful carpet delivered in 1894 and made in Agra at the order of the Viceroy of India, Lord Lansdowne for Queen Victoria.

This carpet is 80ft long by 40ft wide (the imperial measurements of the victor rather than the vanquished!) and weighs nearly a ton.

To allow repairs to the roof, a crash deck would have to be constructed in the room supported by eight piers of bunched scaffolding poles, holes cut in the floor to allow the weight to be taken by the rock under the castle. To enable this, the carpet would have to be moved out of the room, preferably off site, into secure storage. It was suggested that this might be a good moment to check how the carpet was faring after five years under a layer of polyester felt and an Axminster power loom replica that had allowed 1.2million visitors per year access into the room to admire the portraiture.

Since we had undertaken extensive repairs and cleaning to the carpet in 1998 and then in 2014, the Tetley Workshop Textile Conservation Cleaning Facility was approached by the Royal Collection to prepare a Feasibility Study. We went up to the site and met the project manager, Nicola Pritchard and the Royal Collection conservator, Jade Adams. At this point, the threat of a virus originating in China had not yet taken hold and there were none of the restrictions that came later.

We discussed the pros and cons of storing the carpet off site versus on site and the fact that the room would need to be open and accessible to visitors, so not only the piers, but also the boxed carpet, if it was left in the room, would need to have decorated cladding so as not to detract from the atmosphere of the room.

Because of its size (2343 x 1225cm) and weight (to be established, but thought to be around a tonne) some thought was needed as to the taking up and storing of the carpet for two years, the adjudged length of the refurbishment works to the room.

In addition to preparing the carpet for storage, there would be an opportunity to check the carpet for signs of infestation, noting any adverse effects of the last five years on its condition and undertaking necessary treatments.

The advisability for checking dust or macro soil residues from the heavy traffic from the top carpet filtering through was discussed. A further item was discussed, which was that some

tears had appeared by the North fireplace during the rolling of the carpet from the East end of the room, pile inwards. This raised some questions as to the need to stabilise these tears before rolling for storage, as well as implications for excessive handling and rolling of the carpet.

The following possibilities for storage were discussed:

- Storage off-site
- Storage within the room itself. This possibility resolved itself into two options,
    - rolling the carpet lengthways along the warp, providing a shorter roll to be boxed or
    - rolling widthways along the weft making a longer roll to be boxed.

In all the above, the carpet would be prepared for storage in a similar way. It was decided that the option of Storage onsite in the castle , with carpet rolled along the length was best; producing a shorter box, so it would not block the access at the East end of the room.

The following disadvantages for storage off-site were noted:

- The carpet would need to be rolled across its width with a flexible core, carried or low-loadered into a special covered platform in the castle grounds then low-loadered off-site into dedicated secure storage; there were insurance implications, as well as considerations of weather conditions.
- Arrangements would be needed to store the carpet at the same RH and temperature levels.

The following advantages and disadvantages for storage onsite were noted:

Option 1: Boxed carpet rolled along the length (warp):

- Pro: Costs savings could be made by storing the carpet in the room, rather than carried off-site into dedicated secure storage with its logistics and insurance implications.
- Pro: There would be conservation advantages of continuing to store the carpet at the same RH and temperature levels.
- Con: Some thought should be given to the likelihood of visitors sitting on the box.
- Con: There might be problems posed by the carpet sitting on one quadrant for two years.
- Con: There might be difficulties in moving the carpet entirely off-site in the event of fire.

Option 2: Boxed carpet rolled across the width (weft):

- Pro: Cost savings could be made by storing the carpet in the room, rather than carried off-site into dedicated secure storage; logistics and insurance implications.
- Pro: There would be conservation advantages of continuing to store the carpet at the same RH and temperature levels.
- Con: The length of the box would block some of the access at the East end of the room.

- Con: Rolling and storing the carpet on the weft might place greater stresses on the structure of the carpet, the warp being much sturdier.
- Con: Some thought should be given to the likelihood of visitors sitting on the box.
- Con: There might be some problems posed by the carpet sitting on one quadrant for two years.
- Con: There might be difficulties in moving the carpet entirely off-site in the event of fire.

Option 1 appeared to be the best solution with the carpet to be rolled up widthways and turned with interleaving polythene (Figure 1).

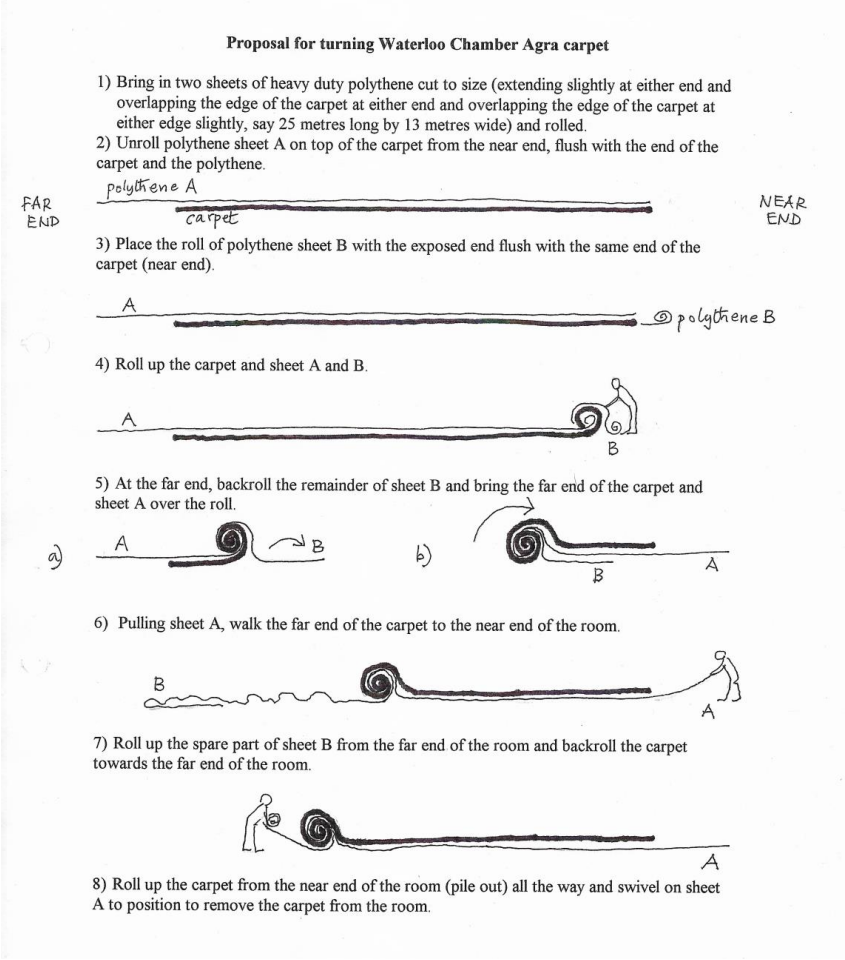

Figure 1. Diagram of rolling procedures used in 1998 ©Jonathan Tetley

The carpet would be rolled pile-outwards along the length of the warp on a semi-rigid roller; a PVC underground drain pipe 160mm diameter, joined and with inner armature, 13m long approx., to take 12.25m of rolled carpet, width of approx. 75cm – 1m was suggested. Sarille bump nylon interlining would be used for packing along the roll to ensure the carpet rolls correctly, also acid-free tissue would be laid beforehand to act as a humidity buffering material during storage, if possible. This might be tricky to accomplish in conjunction with the bump packing, in which case silica gel sachets could be used inside the box.

The roll could be placed at the top of the carpet, on the West end, and rolled towards the East end (double access doors). A suitable box-base with appropriate packing (Plastazote

drilled at intervals to allow aeration in the box) on lockable heavy-duty rollers, probably at 70cm centres, would be placed to enable the carpet to be rolled on to the box-base up an adjacent ramp. Either jacking points along the front of the ramp or hoists attached at lifting points could be used -ramp units that would act as a seesaw once the carpet had been rolled beyond a tipping point could also be used- to bring the ramp up to horizontal to allow the carpet to be rolled onto the box-base.

The box-base would have locating holes/fixing points to allow the sides to be built up with materials affording physical protection fire retardance, and with suitable finish to be visually acceptable. The box would be wheeled into position inside the columns to allow removal in the case of fire.

To establish the weight of the carpet, it was decided to weigh a measured small area (the corner at the North-West end) and extrapolate the weight of the whole carpet from that. This could be accomplished during the survey. In actual fact, this was undertaken soon after the meeting by Royal Household staff and the weight was calculated to be 875kgs.

Some thought was given to the carpet being treated and then boxed in the room. The visitor route would need to be changed from access into the whole room to partial access, probably at the West and East ends except when the ends of the carpet needed to be handled or treated. The Axminster replica carpet would need to be rolled up one half at a time during cleaning and survey work; stanchions to be placed by the roll to allow visitor access on the druggeted half.

Planning for teams to clean, inspect, survey and repair the carpet has started. There would need to be signage prepared for routing and protecting the box. Packing materials would need to be ordered: Tyvek®, Tyvek® tape, calico, acid-free tissue rolls, Velcro® straps, Bump, archival labels and 160mm diameter rollers. A PVC roller would have to be assembled with joining pieces and without protuberances to a length of 12.75m. Porters would need to roll up, remove and re-roll the replica carpet and interleaving material.

The Box would need to be designed and built. It should be able to:

- Allow the rolled carpet to be inserted, including extra width caused by packing materials, probably using a ramped structure to allow rolling because of the awkwardness of lifting and possible threats to the carpet from handling stress. A hinged lid supported might well be best, the other side also to be hinged.
- Act as a support for the rolled carpet, PVC roller and packing materials (shaped Plastazote and Terylene wadding)
- Enable the rolled carpet to be protected from falling objects and inattentive visitors
- Be able to be wheeled with the carpet inside (heavy-duty castors at the right intervals to support the weight of carpet plus box)

The design of the box needed to be thought about, since there seemed to be a number of disadvantages to having a wheeled base, which had to have a purpose-built ramp and would then be assembled onsite (Figure 2).

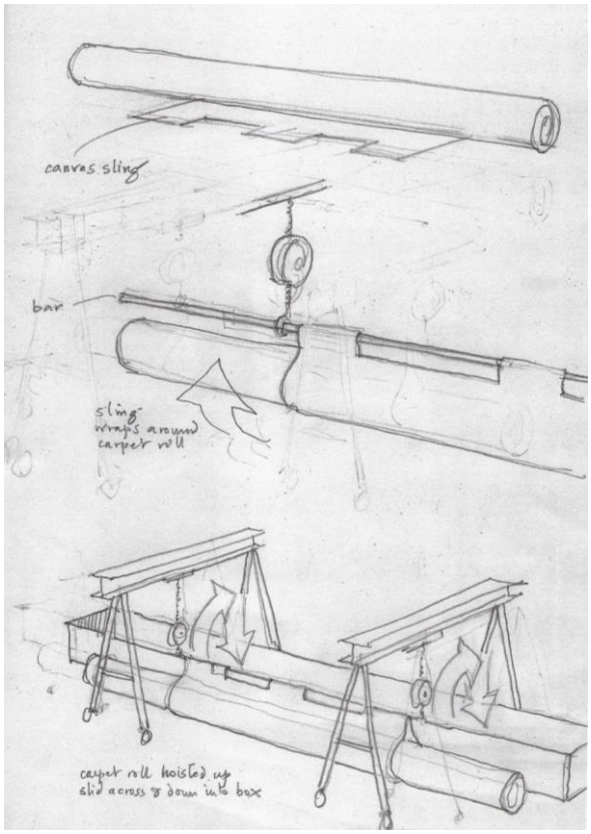

Figure 2. Sling and lift into box ©Jonathan Tetley

Option 1: Box to be assembled around the carpet and wheeled into position:

- Pro: This will enable the carpet to be moved out of the room in the event of fire
- Con: Awkwardness of loading the carpet into the box

Option 2: Box to be loaded using lifts, no wheels needed:

- Pro: This will enable loading the carpet into the box more easily
- Con: Awkwardness of the carpet to be moved out of the room in the event of fire, unless the box is braced and wheeled as in Option 1

Storage off-site was then contemplated, with the carpet rolled along the warps, producing a shorter length to enable easier transportation. Also, that using a lifting crew, subject to H&S requirements rather than cranes or lifts would be preferable.

A preliminary test was decided to determine whether it would be possible to roll the carpet along its warps/length to enable a shorter roll for transport; to be carried straight out and loaded onto transport.

This would be undertaken using the Axminster replica carpet, which is only 100 kilos or so lighter than the Agra. This would be rolled along its length in the Chamber using a cardboard or polythene core to enable a degree of flexibility, to allow it to get out of the building using purpose-made lifting straps, with particular attention paid to the turn in the stairs at the West End of the State Apartments.

If the test proved that the carpet could not be decanted from the building in this way, then the carpet would be rolled up widthways on flexible core and wrapped in calico and thin polythene for carrying out to The Quadrangle/Upper Ward, or to the turning area beyond the George IV gate. Webbing straps would be needed for 30-35 pairs of carriers (60-70 people).

The chosen rolling area by The George IV Gate would be covered in heavy 300g DPM polythene sheeting and possibly tented in the event of poor weather to enable re-rolling outside; if necessary (the wisdom of relying on dry weather was discussed, along with provisions for unexpected storms midway through the process).

The costs of storage off-site seemed prohibitive, so plans for storage on-site were revisited. If the carpet could be rolled up along its length and temporarily moved out of the chamber, the replica could be replaced and the crash deck installed with the piers located through cut holes in the replica carpet. The Agra carpet roll could then be brought back into the room and boxed. The need for a test for removal of the carpet would be avoided by storing the carpet temporarily in St. George's Hall.

At this point, lockdown during Covid-19 was in place and all but work that could not be accomplished from home was proscribed. In addition, rules stated that social distancing of two metres had to be observed and that vulnerable people or people showing symptoms would not be allowed on-site.

It was calculated that around 15 people could roll up and move the carpet on wheeled trolleys using webbing slings. The carpet would also have to be rolled up and turned first to allow survey and repair work on the back and to enable the carpet to be rolled for storage pile-outwards. (Figure 3)

Risk assessments were prepared and were then twice revised to cover the safety measures required to lower the risks of working together to an acceptable level. The castle health and safety officer played a key role in the planning and was present at the turning operation, intervening where he observed breaches of the two metre rule. When the carpet was rolled up and wheeled into St. George's Hall, less people were employed to enable two metre distancing and since the carpet was rolled onto a flexible polythene core, the carpet roll could be lifted by pairs of handlers using slings onto the wheeled trolleys in sections.

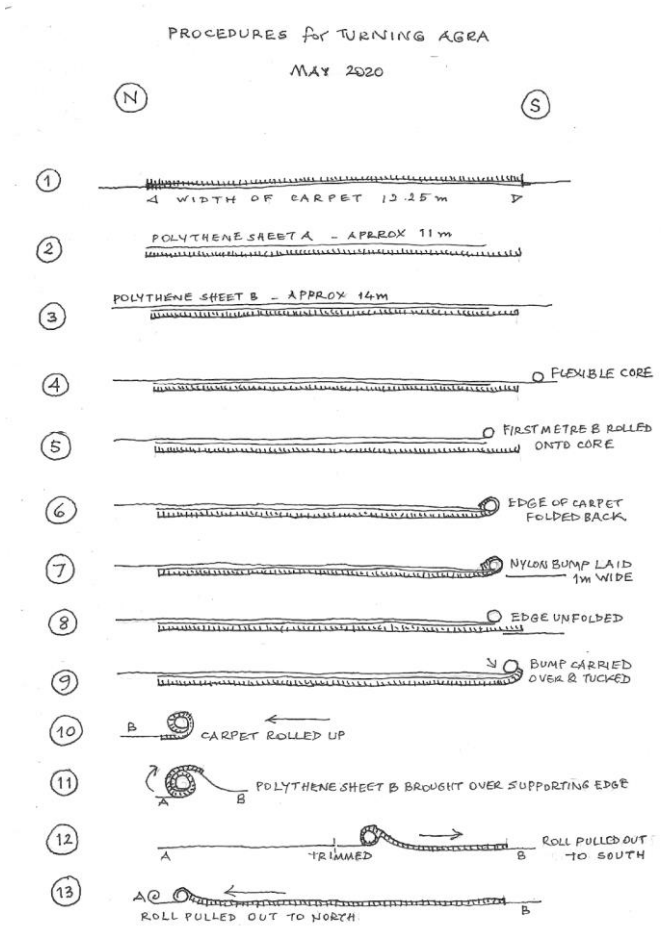

Figure 3. Procedures for turning carpet ©Jonathan Tetley

Future Intervention

It is anticipated that after the building works are completed (completion scheduled for 2022) the carpet will be returned to the Waterloo Chamber and replaced under a protective layer of polyester felt and replicated (sacrificial) Axminster power loom carpet.

Due to the logistical difficulties of transporting, storing and periodically inspecting this piece this seems the best way of preserving the carpet. It was found that little observable damage was done to the carpet since being kept in this way since 2014, although when it had been exposed for a period of entertaining for a few months, it did accumulate stains and accretions.

Rewind to 2004 – Fast Forward to 2021

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This conference is not the first collaboration of the Textile and Historic Interiors Groups. On the 29th March 2004 the two groups, then part of UKIC, held a gathering at the Clothworkers' Hall entitled '*Opening Up Open Display'.* Memories of the event may have faded away completely had not Albertina Cogram and Maria Jordan put in the hard work to collate, edit and publish the seven of the papers presented that day. They were printed and hard copies, bound in simple spiral binders, were circulated to speakers and conference delegates.

What do these papers reveal about the concerns of conservators in 2004 and their responses to the then newly developing trend for '*open access'*? Do their concerns seem dated, have we moved on, or are we facing the same problems? And to what extent are we standing on their shoulders? Written in 2004, the papers must be considered in the context of the time. I did detect some anxieties simmering below the surface, some conflicting values disputes, but I was impressed by the determination to be team players and attempts to devise innovative ways of presenting textiles in historic interiors. Open access does pose a real threat to delicate textiles.

Deep in the professional soul of some, there lurked the certain entrenched beliefs which were exposed, such as *'preservation of evidence is the prime function of a museum',* and '*the real aim is to preserve and protect*'. There was a whiff of a notion that '*open access'* was a fad that would no doubt pass and we would return in due course to '*traditional cases'* and '*proper environmental control*'. Back in 2004, did we conservators regard ourselves as clandestine fifth columnists with hidden agendas? - the designated scapegoat of the museum? Do we still? But the more positive message in many of the 2004 papers was that we must explore our potential to act as pivotal team builders wherever we find ourselves.

It is worth pausing to make a note for posterity. Since the call for papers for this conference was issued the heritage world has radically changed in response to Covid-19. Museums and historic houses are presently dark and empty places. I write in a time of full lockdown (March 2021) when physical access to cultural heritage is severely restricted. But over the last year, in response to the pandemic, our sector has shown great initiative in devising ways to provide 'virtual access'. Necessity is the mother of invention. How many of these innovations will be maintained and further developed when we return to 'normal' or the 'new normal' remains to be seen.

The desire to increase visitor enjoyment, the improvement of educational value, an imperative to earn revenue from increased visitor access and hosting of 'events', were the main drivers of '*open access'*. Conservators were under pressure to facilitate alternatives to the traditional museum showcase.

The foreword to the post-prints is cautious, and perhaps slightly ambivalent about '*open access'*. While acknowledging that Conservation suffers from being labelled '*the profession who says 'No!'*, I suggest, the foreword also intimates that conservators may retreat or toggle into the role of the supposedly 'objective' white coated boffin.

> '*The forum went some way to challenging these notions of restrictive open display, the risks have been identified, but also presented are methods used to monitor damage and the scientifically calculated restrictions that can be used to allow increased access.'* (Opening Up Open Display, 2005. p.6)

The term '*scientifically calculated restrictions*' and the word '*allow*' are only a few steps removed from the despised mantra '*Conservator says No!*'. The foreword concludes in in a slightly negative key,

> *'The post-prints presented here should provide an innovative resource to anyone faced with presenting textiles in less than environmentally ideal historic interiors.'*

Perhaps someone needs to invent a joy-meter to which records smiles and laughter and can calculate the benefits of '*open access'*. But of course, this has been done, in a more prosaic manner. During the last seventeen countless customer surveys have produced hard data to demonstrate the increased levels of joy experienced by visitors.

In his paper, 'Need to Touch'*,* Craig Riley describes the traditional interaction between the public and historic textiles as being rather passive, '*a silent contemplation of the object with suitable awe and respect – divided by sheets of glass - curiosity suppressed'*. This form of presentation tacitly implies that the materiality of the object is paramount, and that understanding and enjoyment does not '*get a look in'*.

'Museums used to be intimidating' Riley states. Implementing change required a radical shift in ways of thinking he argues, whereby '*the visitor becomes central and the object looks outward into our world*'. Appealing to a wider audience, not just the informed *connoisseur*, is now a social and economic reality, Riley states, reminding conservators that Government legislation and Heritage Lottery guidance now favour this approach. The Disability Discrimination Act of 2004 certainly sanctions the prioritisation of ease of access into public buildings over materiality where required.

In 'How open can you get and sustain it' Clare Stoughton-Harris tracked the measures taken to minimise damage at The Museum of Welsh Life (now St Fagan's National Museum of History). She outlined the dilemma facing conservators who clearly felt that open access had been taken to extremes in this open-air museum. The museum which offered free admission was the most visited open-air museum in Europe.

Since 1948 over forty domestic buildings from different parts of Wales have been re-erected on the site. The interiors were filled with furniture and textiles, quilts, blankets, and rugs, and heated by open fires. Some of the windows were not glazed and until the 1990s the buildings had no electricity. The very features most loved by the visitors, the small cosy interiors, open fires, the smoke, chairs and beds that just begged to be sat upon, and rugs there to be walked upon, were those that cause the poor conservators the most concern. Of course, free entry and the memories of their grandparents the interiors evoked spurred return visits with friends and family.

The inarguable success of the museum demonstrated by the increased visitor numbers was bemoaned by the conservators. But by working with their colleagues, they were able to introduce pragmatic measures in the management of the textiles within the interiors, the removal of more valuable and delicate items into controlled environments and replacing

original textiles with 'sacrificial' replicas. The gradual installation of electricity, night storage heaters, blinds, ultra-violet films, resulted in improved environmental conditions. Later physical screens and access restrictions were introduced. In 2004 consideration was being given to introducing timed access, queuing systems and further barrier restrictions to open access. This sounds remarkably familiar to us now attempting to control visitor flow – or will do again when visitors return.

Historic Royal Palaces (HRP), a self-funding organisation, needed to increase the numbers of paying visitors. In 2004, Helen Smith ' suggested in 'Negotiating for Equilibrium'that the burden of '*the duty of care rests with HRP conservators'.* A worrying responsibility, a thankless task, for conservators to be the designated party-poopers of the organisation. The collections within Hampton Court Palace were identified by the conservators as being the most at risk due the popularity of the palace.

Enhanced visitor experiences on offer, costumed period reenactors leading visitors in joyous dances in rooms hung with tapestries, sounds marvellously wild. But it was the duty of the kill-joy conservators to identify the risks of physical damage, additional dust deposits, and increased light levels, and use their professional expertise to open negotiations and offer possible alternatives. They suggested, fewer but bigger events, the holding of events outside where possible or in empty rooms - options which are widely used today. Perhaps the most significant initiative was the sharing the responsibility across the organisation, such as allocating conservation tasks to front of house staff.

The importance of the inclusion of all staff was reiterated in Mary Greenacre's papers 'Tyntesfield – Open to All'. The National Trust's commitment to training, education and inclusion were at the core of the project. But concerns were expressed that these were merely '*of the moment politicized buzz words of today's heritage industry'* and that '*the real aim is to preserve and protect Tyntesfield for the future'* should be upheld by conservators. The Trust's attempts to broaden the demographic of its members were questioned, a distinction being made between '*new audiences'* and '*traditional visitors*'. The impression given was that trend to more open access was a passing fad, which, for now had to be given lip service.

Returning to Hampton Court Palace, Maria Jordan's paper 'Heat and Dust: George II's Travelling Bed Traumas' presented a considered analysis of the impact of 150 years of public access on the last remaining royal travelling bed to retain its original hangings. The paper outlined the bed's conservation history and the tests carried out to determine how reductions in dust, handling, visitor access and heat might possibly extend the life of the fragile damask curtains. Jordan concluded that, '*The conditions on open display, although not ideal, were found to be less extreme than feared*.' And by reducing RH levels and lowering light levels she determined that, *'the life of the curtains could, theoretically, be extended to 137 years'*.

The use of modern sacrificial textiles was explored in my collaboration with historic textile expert Annabel Westman in the Marble Closet of the Little Castle Bolsover, 'Displaying the Missing Hangings'. Multidisciplinary research had established the placement of the original early 17th century wall hangings, *'a sett of crimson taffetie hangings'*. Due to cost constraints and the desire to maintain full visitor access to the Marble Closet, the hangings were recreated using cheap silk which could be handled by visitors if they felt impelled to

touch. Twenty years later and the hangings are still place despite children hiding behind them. But as Westman noted these hangings have too much prominence in the room. In 1618 they acted as a backdrop to the gilded mirrors, pictures, richly upholstered chairs and couches mirrors also listed in the late 17th century inventory. But the modern crimson silk does evoke something of original opulence of the room.

An arresting poster by Irene Greensdale, 'Queen Victoria's Travelling Saloon at the National Railway Museum' outlined the positive aspects of carrying our textile conservation in full public view - an innovative programme at the time. Greensdale summed up the project as *'positive and enlightening but the visitors were also distracting and time consuming.'* Since 2004, the value added to a conservation project by interacting with the public is acknowledged but now provision is made for loss of 'work time' and additional costs are built into the budget to cover this.

So, looking forward to the papers presented in 2021. Has there been any change in our approach to 'open access'? Perhaps there is more celebration of the benefits of conducting conservation work in public view. In their paper 'The Public Conservation of Politicised Chairs' Rosie Cook, Wu Ching-tai and Li I-Cheng demonstrate how public engagement as they worked on the chairs owned by Chiang Kai-Skek promoted interesting political discussions. Their paper illustrates the importance of historic and associational values.

Contested Heritage is an issue in which conservators are becoming involved and are perhaps well placed to facilitate. What traces do we retain? What traces do we remove? In 2021 conservators are more alive to the wide range of values attached to heritage objects. It is not just about preservation of the textiles.

The papers presented today demonstrate that the conservator's mind-set is now more open to devising ways of increasing access rather than impotently bemoaning the appearance of hordes of dust shedding visitors. Viola Nicastro accepted the visitors and the dust and set about designing bespoke protective dust covers for an important state bed.

Exploring new materials such as lightweight acrylic glazing used to glaze the Burne Jones tapestry at Exeter College Cambridge, ensured a much better display and protection of a rare textile in a place of public worship. Pragmatic rotation of objects on display will minimise damage and increase the variety of the display. Knowledge exchange projects ensure conservation continues to build and improve from generation to generation. Understanding that significance of objects often lays in their continued functionality presents challenges. Rare books with textile bindings or bound catalogues containing fabrics such as the famous Vinegar Bible and the oversize Board of Trade Sample Books are conserved so can still be read and consulted.

Advances in technical innovation in the world of carpet conservation during the last seventeen years are best illustrated by the Eyemat®. An innovation discussed by National Trust in the paper 'The Ubiquitous Eyemat®'. The Eyemat® and the use of replicas of historic carpets to protect the original discussed by Heather and Jonathan Tetley in their paper 'The Waterloo Carpet at Windsor Castle' are perhaps the most significant advances in carpet conservation, quite literally allowed the public to enter an historic interior; hopefully banishing the horrible strips of drugget to history. But I have to ask a question. Just when

will anyone be able to see and experience the original carpet in situ? By protecting the carpet making digital replicas, have we effectively made the original disappear?

In conclusion, we must make a promise to hold another joint conference in 2038 - possibly called ‘Back to the Past Yet Again’ – to review what we are doing today and evaluate what impact we have had, if any on the future of textiles and historic interiors.


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