

TAPESTRY CONSERVATION
Maintaining the woven picture

Forum of the ICON Textile Group

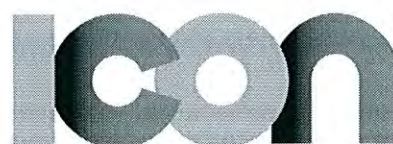
TAPESTRY CONSERVATION
Maintaining the woven picture

Forum of the ICON Textile Group

24th April 2006

The Clothworkers' Hall, London

Edited by Marilyn Leader & Nicole Rode



THE INSTITUTE OF CONSERVATION

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Foreword

'TAPESTRY CONSERVATION – the woven picture' was a one day forum held by the ICON Textile Group in April 2006 at the Clothworkers' Hall, London.

Chaired by Jenny Band, the forum began with her opening speech which paid tribute to Fiona Hutton and other sadly missed colleagues. Jenny dedicated the Forum to the memory of Fiona.

During the course of a busy and stimulating day ten papers were presented, which covered a range of issues relating specifically to the conservation of tapestries: cleaning and support treatments, storage and care, reproduction of tapestries through digital imaging and depictions of the Great Bustard in tapestries. Also presented and summarised were the results of a questionnaire relating to tapestry conservation practice and experience, which was prompted by ICON successfully raising HLF bursaries for work based training schemes.

I am grateful to all the contributors and to the ICON Textile Group committee for their work in organising the event. Special thanks go to Nicole Rode for her valuable assistance in editing these postprints

Marilyn Leader

Textile Group committee member & Postprints Editor

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The National Trust Textile Conservation Studio

Introduction to the ICON Tapestry Forum, April 24th 2006

Jenny Band, Forum Chair

I'm really delighted to be chairing this ICON Forum devoted entirely to Tapestry Conservation. It is wonderful to see an audience of about 150 people who are all involved and interested in this very specialist field. I thank you all for your participation in preparing papers and in contributing to the lively discussions, which form a distinct part of the benefit of such a collective Forum!

However, I know we are all keenly feeling the absence today of our much loved friend and colleague, Fiona Hutton, who died so suddenly last May (2005).

Fiona was such a bright star and always an inspiring presence in our community. Her passing not only shocked us all - but also left a huge void in our profession. Fiona contributed enormously to the developing field of tapestry conservation in Britain. Thankfully, with the determination of her husband Jony Russell and Alison Lister, her studio "Textile Conservation Ltd" continues to go from strength to strength, building on the firm foundations and commitment that she and Frances Lennard laid, back in 1989. In fact the Studio and I are currently working on different aspects of one particular project at the moment and I can say at first hand that their work is exemplary. Fiona would be so satisfied to see this as her legacy. She treated and cared for so many tapestries throughout the UK but equally significantly, she generously passed on her knowledge and experience to many people in the audience here today. She would doubtless have been an energetic contributor to this forum.

Frances Lennard and Jony Russell have prepared a poster about Fiona's life and work, which we are sure will be an inspiration to us all. I urge you to make the time to go and see it. The poster display is, of course, a vital part of this Forum. Fiona is sorely missed but we carry her bright memory with us. We hope that it will be a fitting tribute to her to dedicate this Forum to Fiona.

But before we launch straight into discussing the finer points of conserving tapestries, I thought it might be interesting to reflect on what tapestries actually mean to us. Why do we value them? What do they signify for us? Are they just large textiles?

Certainly they are distinguished by bearing images integral to their construction. These were rarely purely decorative, even in the eighteenth century when they expressed social aspirations through fashion. Prior to that they tended to embody wisdom or moralising themes interpreted through allegory.

The finest, often smaller, tapestries were frequently devotional pieces created for use in private chapels to inspire meditation and prayer. These pieces were capable of powerfully invoking in the viewer the very essence contained in their subject matter.

Larger late fifteenth and sixteenth century mannerist tapestries contended with other works of art to be seen as objects of *virtú* or *meraviglii*. In other words their artistic and technical achievements and the virtuosity of remarkable works of art produced in a challenging medium were deliberately aimed at inspiring awe in the viewer who at that time had the eyes to see and to understand the time-consuming colour changes, the skilful modelling and detail and the value of each dyed or metal thread.

Vasari said of Raphael's recently completed *Acts of the Apostles* tapestries that

'the project was so miraculously executed that it makes anyone who sees marvel to think that it was possible to have woven the hair and beards and to have given such softness to the flesh with a thread: this was certainly more the result of a miracle than of human artifice.'

Although this was a connoisseur's perception, such an achievement was none the less visible to all who viewed the tapestries in a way which eludes our modern perception.

But do we, as conservators generally view tapestry as an élitist commodity because of what has been passed down to us?

Well, the following extract from William Harrison's *Description of Elizabethan England*, written in 1577, may add to our perception. Harrison observed that:

'certes in noblemen's houses it is not rare to see an abundance of arras, rich hangings of tapestry, silver vessels and so much other plate ...Likewise in the houses of knights, gentlemen, merchantmen, and some other wealthy citizens it is not geson (sic) to behold generally their great provision of tapestry, Turkey work , pewter, brass, fine linen etc.'

But he continues that:

'in times past the costly furniture stayed there, whereas now it is descended yet lower even unto the inferior artificers and farmers who... have for the most part, learned also to garnish their cupboards with plate, their joined beds with tapestry, and their tables with fine napery'

Harrison goes on to say that:

'if our fathers or the good man of the house had...within seven years after his marriage...purchased a mattress or flock bed, and

thereto a stack of chaff to rest his head upon , he thought himself to be as well lodged as the lord of the town'

So we are able to see that within a single generation leap, tapestry and beds had become almost commonplace in England, which they really were not before 1600. Rich tapestry, however, was generally bought via the great market fairs in the Low Countries where the raw materials of yarns and dyes were also traded.

One of the most enriching aspects of tapestry conservation work is the opportunity to come into intimate contact with the craftsmanship which went into every aspect of tapestry production. It allows us to develop the eyes to see and understand tapestries and their usage in the terms of their time. But how often do we really consider our tapestries' production beyond the obvious presence of the weaver?

Probably most of you are familiar with the documented contract for a set of 12 tapestries celebrating *The Conquest of Tunis*. But I thought it might be appropriate to summarise it.

In June 1546 Maria of Hungary, (Charles V's sister) commissioned Jan Vermeyen to transpose the eyewitness drawings he had made of the battle scenes at Tunis into full-sized tapestry cartoons. Using a team of painters, this work took 18 months. In February 1548 a contract for making the tapestries was agreed with Willem de Pannemaker. The contract stipulated that only the finest materials were to be used; nothing but Granada silk – and no skimping. The warp must be the finest Lyons thread – or finer if it could be found. Gold, silver and silk threads were to be used together in the borders, with 2 picks of silk between each metal row. Maria was to provide her own silver and gold thread, stipulating that 7 types of gold and 3 of silver were to be used. The effect must be as rich or richer than her recent purchase of a set of *Vertumus and Pomona* – which was already exceptionally lavish.

Pannemaker was to subcontract the work to seven master tapestry makers, whose workforce totalled at least 42 weavers. The key element was lavishness. Maria closely supervised the purchase and quality of the materials. The cost was phenomenal and was handled by the bankers who regularly oversaw Maria's tapestry purchases on behalf of the Emperor. The tapestries were completed in April 1554 (eight years after their commission). Pannemaker then accompanied them to London. Their destination was Winchester Cathedral where they were to hang for the marriage of Mary Tudor to Philip of Spain that July. Following that they were put on display in Antwerp and Brussels before being finally hung in Philip's Toledo palace - ten years after they were first commissioned.

This, of course, was the top end of the market and I thought that it would be interesting to include the following brief and roughly contemporary account of the manufacture of a length of simple plain-weave blue woollen cloth. This

record comes from an economist, Professor Melis' study made in 1954, using the Datini archive in Prato Italy.

Tracing the merchant's accounts, Melis found that the Italian merchant ordered the wool from a shepherd in Majorca in November 1394. The following May the fleece was shorn and an agent collected it from Minorca and chartered a Spanish ship - which was delayed by storms until the end of July. From Minorca to Barcelona the ship needed protection from the serious risk of pirates and two other galleons had to escort it. Reaching Barcelona in September, it continued on to Porto Pisano for seven weeks, sailing alone, but had to arm itself with 12 hired archers.

Thereafter the cargo was divided, wool-fells (or skins) going by pack-mule across the mountains to Pisa and the lighter sacks of fleece by sea and then river. At Pisa the sacks were re-packed into bales, some were sold and the rest arrived in Prato the following January.

Producing the cloth took a further 6 months. This involved beating, picking, greasing, washing, combing and carding the fleece. The wool was then 'put out' to 96 peasant women (and probably children) to be spun in their homes using a whorl and distaff - spinning wheels could not yet spin the required strength of yarn stipulated by the Guilds. Then ten metre long warps were measured, counted and mounted onto the loom. Next the cloth was woven. It was then 'burled' to remove flaws, shorn damp, stretched to dry, teased, shorn again. Only then was it sent off elsewhere to be dyed blue. Once dyed it was napped, shorn again, pressed, folded and baled. Each process required different specialists and equipment in different locations.

The bales of cloth then travelled by pack-mule across the Apennines to Venice and by ship to Majorca; a seven week journey. But a stagnant market and a serious outbreak of plague there forced their transfer to Valencia and then on to Barbary and eventually Palma where they finally sold in the following spring - a production and marketing time of 3½ years since the merchant ordered the wool, and involving thousands of miles being walked, climbed and sailed. From all this work the merchant made a profit of just under 9%. (And we think we have trouble getting conservation materials!)

Hostile politics, bad weather, wild animals, pirates, bandits, avalanches and lack of maps made such journeys treacherous and uncertain. In addition, economic forces often stagnated because of political obstructions. Melis calculated the cost of the raw material as 15% of the whole, with 40% for manufacturing and 45 % on transport and administration. Cloth making, even at this simple level was slow and capital intensive.

Based on this model for spinning time, a fine tapestry of the same meagre dimensions, might well have needed 864 spinners because of the thinner weft: warp ratio. An incalculable amount of additional dyeing time would also be needed for a polychrome design. Rich tapestries also contained silk, gold and silver threads mainly produced in Constantinople or Venice and each of

those had their own laborious production process and transportation time. To this calculation of labour could also be added, the months of shepherds' work, protecting sheep from death by dogs or sheep-scab, dye stuff growers, traders and dyers, alum suppliers, fullers-earth traders, fullers, metal miners and gilt thread makers, silk growers, guild officials and merchants, balers, linen sack producers, weighers, packhorse drivers, carters, shippers, sailors, crossbowmen, shopkeepers, bankers and insurers.

This study revealing the enormity of the whole process of manufacturing and selling an unexceptional length (or at least a consignment) of blue cloth gives us a rare insight into the workings of the textile market. The sheer legwork alone is astounding. But it also highlights the collaboration (often having to work their way around political embargoes, changes of national boundaries, the politics of staples and the changing physical properties of trading ports), of so many tradesmen in this immense pan-European labour network. The textile market in the Early Modern era used a finely tuned political awareness to negotiate its way through the political maze created by their monarchs who so tactically jostled and fought.

Interestingly for our perception of tapestry, this all suggests that tapestries could be viewed as valuable physical documents proving the determined inter-dependence and cohesion of Europe's socio political forces at the mercantile level which really forged the emerging world of early modern Europe. Tapestries are extraordinarily rich in what they can offer as didactic tools and I hope that this brief excursion may just prepare our perception to appreciate today's talks in a wider context.

Tapestry is a HUGE subject if one is to study and understand it well and, like the production process itself, becoming skilled in tapestry conservation takes a very long time since its larger scale necessarily implies a slower accumulation of broad conservation experience than most other textiles. But this breadth of experience is absolutely vital to the conservation profession since, as all conservators know, tapestry conservation appears superficially simple, but is in reality, fraught with possibilities for making irrevocable mistakes.

A misjudged tension, an inadequately calculated lining system, an inappropriate infill for a missing area, a poorly dyed thread, a misinterpreted shape, an inappropriate support system can all disfigure or permanently damage a tapestry. Knowing what is significant evidence in a tapestry is also a learned skill. A curator said to me only recently: 'I get so angry when conservators cover up evidence that we need.' These and many more subtly misguided actions can produce the need for expensive correction and further damage to a tapestry. It takes considerable skill and understanding to do it well and as we know only too well from the dealers' market in this country, there are so many ways of doing it badly.

Just as in the provision of medical services, the more sophisticated our conservation treatments become, the more we also need to understand,

predict, explain and justify our actions. Like medicine, conservation relies on evidence-based research, and the ability to really see, understand and interpret our tapestries is a vital tool. Most tapestry collections range from the sixteenth to eighteenth centuries but this does not necessarily mean that the younger ones have a full 200 years of active use left in them. As the recent research in *Measurement of Damage to Historic Tapestries* all too clearly demonstrated, even seasoned conservators often underestimate the degree of damage inherent at the molecular level in tapestries, simply because they appear superficially sound.

And I say this from experience, having witnessed the way tapestries appear sound until they are disturbed and then within weeks, if not caught in time, damage can spread like a stain on blotting paper. Most tapestries 'of a certain age' cannot withstand *any* handling without significant damage being incurred and this problem will only increase. Unlike Ariosto's sixteenth century assumption in *Orlando Furioso* where he deliberately uses tapestry as a metaphor to indicate something unchanging and unchangeable, those in charge of tapestry collections today are acutely aware that they are engaged in a desperate race against time and that nothing stands still. Every collection is on a downwards-travelling escalator and we are its only braking system.

In some ways conservation can become a victim of its own success when, having conserved the worst element of a fragile collection, it then appears more stable than it is to the next generation of custodians who then underestimate the momentum needed to maintain it. And this is where real research, observation, experience and understanding becomes vital and why a Forum like this provides an essential opportunity to articulate our work, share our experience, challenge and reconsider ideas and really learn to observe – and even to conserve in new ways.

Building on the wonderful achievement of the book *Tapestry Conservation Principles and Practice* we, as a profession need to value and capitalise on our experience. This degree of understanding is also demanded as funding applications inevitably require statements of significance and cultural value to justify the cost and to persuade uninitiated decision-makers and budget holders that tapestries should be preserved in this labour intensive way. It is therefore our responsibility because of the particular insights we have, to help increase popular access to these otherwise obscure works of art.

Similarly, the desire, traditionally driven from within our discipline, to explain conservation principles and processes to a wider audience, requires a context to engage a wider public. These factors all put a particular onus of articulation onto the tapestry conservator. And it is with all these contextual issues in mind that we shall begin this special Tapestry Conservation Forum, dedicated to our dear friend and colleague, Fiona Hutton.

Striving for Both Economy and Efficacy in the Treatment of Two Sets of 17th Century Dutch Tapestries.

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1. Introduction

In the Netherlands in the early 1990s, the government launched a strategy, named the Delta Plan, to upgrade the management and conservation of the national museums' collections. Funding was made available to survey conservation needs, to improve storage and security and to carry out essential conservation treatments. In many cases, major building renovation works were carried out in this drive to make a new start in preserving the nation's most significant collections. Various museums with small textile collections grasped this opportunity to be able to have their objects expertly assessed and eventually treated. This resulted in a surge of commissions for textile conservators until 1997 when this phase of the Delta Plan ended.

Between 1993 and 1997, three sets of tapestries and a single work were treated in the author's workshop then known as Andelos Textielrestauratie. A changing team of 12 freelance textile conservators, students and volunteers assisted.

1.1 Aim / vision

In retrospect, the taking on of these commissions represented a leap of faith of her abilities for the author, as her experience of tapestry conservation was limited to brief training periods during training at The Textile Conservation Centre in the early 1980s and observations of other workshops in various countries. Despite this lack of vast experience, an impression had been formed that much of the stitching involved in support treatments was not only excessive but also often counter productive in decreasing stress on the object. It is certainly very labour intensive. It is uncertain whether this approach is based on tradition, unbridled perfectionism, uncertainty or a combination of these factors but it is surely not based on scientific principles like physics and engineering. Should this impression prove to be true, the result is a waste of time, materials and money (the latter due to the resulting high treatment costs). Then there are the health problems arising from the bad posture one is forced to assume in carrying out stitching treatments over long periods of time.

To overcome the lack of specialist experience, the approach for these projects was to treat tapestries as large, flat and heavy woven textiles. This paper relates how a satisfactory balance between minimal intervention and maximum efficacy was achieved.

2. The museums and the tapestries

The first set of tapestries treated came from Museum Mesdag in The Hague. It is the home, studio and gallery of the artist H.W. Mesdag (1831 - 1915). The museum had been run by a foundation set up by the artist's family and had just been taken over by the Van Gogh Museum Foundation in its new status as the national museum of 19th century art. The second set of tapestries treated came from the Rijksmuseum Twenthe in Enschede that had just become the national museum of 18th century art. The collection is largely devoted to fine and applied art. Both museums were undergoing major building renovations with a similar deadline: a grand reopening!

Coincidentally, both sets are attributed to the same tapestry workshop that of Maximillian van de Gucht of Delft and were probably woven between 1650 and 1675. Both sets are Verdures, however the Mesdag set are coarsely woven (22 wefts/cm) while the Twenthe set are finely woven (52 wefts/cm).

2.1 The tapestries from Museum Mesdag

These tapestries were displayed as wall coverings attached on all sides. They were overall strong, moderately soiled with some areas of weakened silk, areas of loss and old repairs. The following treatments were necessary:

- removal of old linings
- wet cleaning
- application of a full support
- replacement of weak slits and distorting or unsightly repairs
- camouflage of areas of loss
- application of a mounting system

2.1.1 Materials

A linen scrim was chosen with the aim to use a soft, lightweight, flexible support layer. The tapestries were largely self supporting except for localised damage and weakness. The full support was needed to share the stresses that would be involved when mounted. Patches of olive green, cotton poplin were tacked under areas of loss or missing wefts where intensive stitching required a firmer foundation than the scrim could supply and where transparency of the affected area needed to be visually filled in. In the absence of suitable cotton or linen threads, polyester machine sewing thread was used throughout. For slits, buttonhole thread was used except for when a specific colour was not available, in which case double machine thread was used. For support running stitches, double machine thread was used because it was less noticeable and there were more colours available.

2.1.2 Treatment - wet cleaning

Wet cleaning was carried out using a temporary wash bath on the floor and aided by a water suction vacuum cleaner to remove wash and rinse water more

effectively. The removal of soil is dramatically improved using a water suction device. The satisfyingly decreasing amount of suds, soiling and increasing pH can also be easily monitored after each rinse. Cleaned in this way, the tapestries were rarely sopping wet when being moved, so further fibre damage was avoided (wool is very weak when wet) and it was light work. Furthermore, the tapestries were quick to dry - overnight in most cases (Barnett, 1998).

2.1.3 Treatment – support

The approach was based on the idea that the tensions of the tapestry (or any textile for that matter) and the support layer must be well matched in order for the textile to be supported. For the support layer to be effective at the end of the application, its tension must be equal to or a little more than that of the textile and also be evenly distributed. Otherwise, the support will hang from the textile (i.e. no support function) thereby adding to the weight that it already bears.

It is generally known that, depending on the degree of control exerted on the tensions of the two layers, stitches tend to take up fabric by pulling on it. Therefore extra fullness (known as bag) is generally provided in the support layer to account for this. In this case, a minimal amount of extra fullness was created as follows. The washed support layer was marked in a 41 x 41 cm grid with white tacking thread. The tapestry was similarly marked with a 40 x 40 cm grid. The grids were then aligned, pinned then stitched together along the grid lines on the tapestry. The tacking of the linen was later replaced by the drawing of threads: the weave was loose enough for this to be a quick and simple task and provided viewing slits to locate the marking on the tapestry. The tapestry was then attached to two rolls (PVC drainpipes with an adhered skirt of cotton canvas) by pinning. Pinning is just as effective as stitching while saving time and allowing for any eventual quick tension adjustments. This method was used to avoid the need to ease in bag with every roll on and to allow people to work on the tapestry from both sides simultaneously

At completion, should there be areas of excessive fullness or tension, these can be corrected by respectively making darts or vertical slashes (the direction of the most tension both when hung or mounted) in the support layer. Adjustments turned out to be unnecessary, probably due to the method used to control tensions in areas of intensive stitching such as areas of loss (Fig 1).

To treat areas of loss, a small tension frame of foam board was laid in place underneath an area supported on two strips of foam board that rested on top of the rolls. The support layer and tapestry were then pinned under tension (considerable as the aim is to control) in the warp direction onto this supplementary tension frame. Then stitching was carried out. The result of this local tension control is that very little of the support layer is taken up so that there is no significant difference in the tension of both layers at completion; i.e. no puckering of the support layer at the edges of the stitched area. Also, carried out thoughtfully, it ensures that the tapestry and support layer are well aligned

thus avoiding local areas of tension caused by any distortion of the woven structures (Fig 2).¹

Overall support stitching was applied in the standard way: alternating, staggered lines of running stitches in a brick laying pattern from top to bottom. The aim is to evenly distribute the weight of the tapestry over the area of the support layer. Extra lines of stitching were made at the top edge as this area bears the maximum weight of the area of tapestry below it (not the weight of the entire tapestry as some seem to believe). Stitches were made over two or three warps to distribute the tension of the stitch as much as possible without it being too visible. Polyester machine thread is more elastic than cotton, linen or silk and so required more stitching tension. This was a concern at first but so far there seems to be no negative effect.

As these tapestries were to be mounted along all four sides, one could say that horizontal support stitching would also be necessary. However, since the force of gravity (i.e. the weight) is not entirely negated by tension applied at the sides so that the tapestry will still sag, vertically directed support would seem to be sufficient.

Only weak or unsightly slits were replaced. These were marked with orange glass topped pins so that the assistants could work on without having to make the decision themselves.² Such marking also provides an overview of the damage pattern and facilitates making strategic choices.

Areas of lost wefts were camouflaged with so-called couching stitches in matching colours of stranded, mercerised embroidery thread or custom dyed woollen yarns. Lost warps were replaced with a matching cotton twine (the original warps are of linen) that was secured at both ends to the patch and support layer rather than being forced through the tunnel of an original warp. The latter method was considered to be unnecessarily invasive in this case as the tapestry will not be self supporting.

2.1.4 Mounting with staples

When it came time to consider the method of remounting the tapestries, not only was time pressing, it was discovered that there was very little space between the wooden slats in the wall and the decorative frame that would cover the edges of the tapestries. There was no room for the standard use of hook and loop fastening tape. Inspired by the use of staples in upholstery conservation, it was decided to adapt this method (Barnett, 2007).

In brief, the walls were first covered with polyester film to prevent the deposit of fine soiling borne by any draughts passing through the wall. Then wide cotton webbing was stapled to the wooden slats to provide some cushioning for the

¹ This local technique has been carried out on all kinds of textiles by the author with great success in controlling tension. It can also be applied to working flat on a pinnable board. Weights are not effective enough in holding layers in place under the tension required.

² It was difficult to convince some assistants that slits did not need to be re-stitched because they were visually disturbing from 20 cm away.

tapestry. A thick, firmly woven cotton tape was placed over the edge of the tapestry to which stainless steel staples were applied by a pneumatic stapler. The function of this tape was to prevent the staples sinking into the tapestry structure and to spread the pressure of the staples so that less would be needed. A fortunate extra advantage is that removal of the tapestry is easily achieved by simply pulling the tape up. The greatest advantage of stapling was the saving of about 400 hours of hand stitching.

2.1.5 Results

A total of 14 tapestries were cleaned, well supported and installed on time. Average treatment times of the Van de Gught set of 10:

- full treatment - 56 hours/m²

Breakdown:

- washing - 3.3 hours/m²
- preparation, support stitching and slits - 26 hours/m²
- areas of loss - 27 hours/m²

The time spent on camouflaging areas of loss was out of proportion with the visual results. As this technique was new to the assistants, treatment times were at first longer than usual. In addition, an important lesson was learnt in aesthetic factors when considering the replacement of previous repairs. One area of coarse reweaving in three different woollen yarns on an area of silk sky was replaced with the standard 'couching' stitching technique. The finer new stitching, while better matching the surrounding woven silk also appears visually obtrusive due to the darker colour of the linen warps that are more revealed. By comparison, the coarse woollen reweaving appeared more authentic than the precise and fine 'couching' in stranded embroidery cotton.

The whole project could have been carried out more efficiently in general as, after all, it was a first tapestry project, much had to be learnt on the job and due to other projects and teaching commitments, full focus was not always possible.

2.2 The Rijksmuseum Twenthe tapestries

Meanwhile, the Twenthe project began halfway through the Mesdag project. These tapestries were displayed hanging. They were overall strong, moderately soiled with some areas of weakened silk, areas of loss and old repairs. In general there were very few large areas of silk and the weave was very fine and tight resulting in more structural cohesion than the more loosely woven and coarser Mesdag set. The required treatments were similar to that of the Mesdag project but with the following differences:

- application of a lining
- re-application of a hook and loop hanging system.

The lessons learnt with the Mesdag project led to some changes in treatment for this set as did its different nature. To start with, a resolve to be more satisfied with 'good enough' rather than striving for a perfect visual result that is not noticeable when viewed on display stimulated a more minimal approach with the slits and areas of loss. The greater detail in the design allowed more visual freedom compared with the comparatively large areas of flat colour of the Mesdag verdure where every slit was obvious, while the greater structural cohesion decreased the need for intensive all over support.

The main aim can be summed up in the term 'strategic placed treatment', as opposed to a standard overall treatment.

- not all weak slits were replaced, only those where the slit would pull apart if neglected; or only in areas attracting attention such as flowers and animals in the foreground.
- no standard camouflage 'couching' stitching; instead, one or two strategically placed couch and span stitches over the middle of an affected area (all quite small).

Futhermore, some tasks were farmed out which freed up time for other work. The tapestries were cleaned at the firm De Wit in Mechelin, Belgium using the very efficient and effective aerosol suction cleaning technique (Maes, 1998).

The local laundromat was used to wash the support linen and lining fabric following my instructions. The linen fabric was collected wet and smoothed out to dry naturally on a flat surface. This resulted in very slight undulations that could function as built in bag.

Materials used were the same as for the Mesdag project except for the lining, in this case a closely woven, cream coloured downproof cotton.

2.2.1 Setting up the support layer

With the first tapestry to be treated, the support layer was tacked to it as in the first project. However, this turned out to be a slow and laborious task as the denser weave made tacking with a curved needle very difficult. The linen-on-a-roll system was quickly adopted. The easing in of bag after each roll on was simpler than expected, partly because the high degree of tension control afforded by using the small tension frame prevented the formation of any significant taking up of fullness. The limitation of not being able to work on both sides simultaneously was solved by first applying all the support running stitches then removing the linen roll.

2.2.2 Application of support stitching

In a hanging textile, most of the weight is borne by the top edge. Proceeding towards the lower edge, the weight borne by lower areas of the textile gradually diminishes. Therefore, the maximum degree of support needs to be applied to the top third while the lower third hardly requires support at all. Taking this into account, the number of rows of support stitching was increased at the upper 50 cm by adding extra rows in between the overall staggered brick pattern. Of

course, significant areas of weakness or damage demand more support but this is in addition to the overall weight support system. Less support stitching was applied at the lower quarter of the tapestry.

2.2.3 Strategically placed slit stitching

Weak slits did not form a great risk for the structural integrity of these tapestries as the busy, detailed design produced mostly short slits of a couple of centimetres in length. The re-stitching of slits was restricted to those below an area of weak silk or a group of smaller weak slits. Slits crossing a line of support stitching were not re-stitched.

The major exception was the architectural features with their long, horizontal elements along the top edges and some sides. There all the (rather long) weak or open slits were re-stitched to provide more overall support where it was most needed at the same time. In the lower third of the tapestries there were more cases of coarsely executed slit stitching on the focal points of flowers, birds and animals. Here most of the visually disturbing slit stitching was replaced. Needless to say, the system of marking the slits with coloured glass headed pins was essential for this decision procedure.

2.2.4 Strategically placed laid couching

There was only one large area of weak silk sky on these tapestries. Here all the weak slits were re-stitched which then formed convenient anchor points for the placing of laid couching stitches. In this case, laid couching stitches would provide more direct support than extra running stitches. Camouflage couching was unnecessary as there were no areas of missing silk. In any case, the laid couching stitches are comparatively less invasive, less labour intensive and easier to remove than camouflage couching. That said, the location, colour of and fall of light on the treated area on display could combine to become unexpectedly visually obtrusive. In this case, there was no problem.

A patch of cotton poplin was placed under the area for extra support. Polyester machine thread was used for the couching. The fixing stitches applied to the laid thread were placed diagonally across a warp to prevent the stitch sinking into the silk warps. This can cause fibre breakage and a break in the surface plane which can be obvious with such a thick textile. As a minimum of stitching was to be applied, its location was carefully chosen. Scattered strong areas (areas of strong silk, re-stitched slits or lines of support stitching) were linked together to create a continuous matrix of support. Stitches were placed as far apart as possible without (hopefully) losing the support effect between them (Fig 3).

2.2.5 Loose lining

The final steps were to apply the hanging system and loose lining. Downproof cotton was chosen for its close weave to exclude airborne soiling and, hopefully, any wool-eating insects. First the lining was stitched to the top edge of the tapestry then the hook and loop fastener (machine sewn to cotton tape)

was stitched on through all layers. Each tapestry was then hung for at least two weeks to allow it to hang out and provide any overlooked tensions and weaknesses the time to appear (which they did not). Only then was the lining pinned in place while still hanging. Some fullness was eased in along the edges with a little bag along the lower edge to allow for any further extension in length due to eventual increased humidity. Then the tapestry was taken down and the lining stitched only along all edges. This author believes that more stitching is unnecessary as a full support is already in place. Furthermore, additional connection to the body of the tapestry, if applied with fullness, will only add to the weight it already bears. There was the temptation was to let the lining hang loosely from the top edge but the function of protection from soiling and especially insects would have been greatly reduced (Fig 4).

In retrospect, the extra fullness was probably unnecessary as the stiffness (plenty of inter-fibre friction) created by the fine, tight weave of the tapestries would probably prevent further significant fibre extension.

From the outset it was clear that not all the tapestries could be finished in time for the re-opening. However the museum required that all tapestries be hanging for the festivities. This meant that two would hang for about a year without a full support treatment. They were assessed as being strong enough when provided with support along the top edge and at a few areas of weak silk. Indeed, when examined on their return, there was no discernible damage and it must be said that unencumbered with extra material they hung very straight and flat which looked good. It made one aware of how supports and linings can affect the 'hanging plane' and raised the question of how that should be or whether it matters at all.³

2.2.6 Twenthe results

A total of six tapestries were cleaned, well supported and installed in the agreed time frame.

- Excluding cleaning and including lining in all cases, the average treatment time was 36 hours/m²
- First piece and the largest - 47 hours/m²
- Last piece - 20 hours/m²

³ At the exhibition "Oudenaarde tapestries from the 16th to the 18th century" in Oudenaarde, Belgium in 1999, there were tapestries loaned from all over the world representing a wide range of treatment styles. The patterns of stitching attaching linings and/or supports ranged from the slightly to the very obvious and were evident through patterns of distortion on the tapestry surfaces. It would have been interesting to take the opportunity to inventory the various methods and their results.

2.2.7 Time savers

- Fine, closely weave and predominance of wool created a strong structural cohesion so that there was less need for overall support
- Few small areas of loss and only one large area of weak silk (see laid couching) strategy
- Slit re-stitching applied only where necessary
- Laid couching applied instead of intensive use of small stitches
- Lining attached only at edges
- Some treatments were farmed out

3. Conclusion

The aim to employ the most minimal yet effective treatments possible was largely achieved. It was not just the external time pressures that drove the objective, it is also my general aim in formulating any treatment. All tapestries were hanging well when last seen, some years after their installation. I feel that tapestries are essentially strong objects and that support treatments in many cases could possibly be even more reduced than those described here. However, not enough fundamental research has yet been done to form a clear picture of the tensions and forces in play and their real effect on the woven structure, especially over time. I would like to see more physics and engineering involved. A good start would be co-operation with a structural engineer who can set up a digital calculator model of stress patterns combined with all the textile factors so that behaviour could be predicted under given variables. This could also be applied to other forms of textiles that undergo considerable tensions such as upholstery and costume. If not, we will all be dead and gone before the long-term results of our many hours of effort will be fully revealed.

Acknowledgements

I would like to thank all the colleagues, students and volunteers without whose assistance the work could not have been completed in good time.

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Corpus Wandtapijten part 2

Hartkamp-Jonxis, E. & Smit, H., 2004. *European Tapestries in the Rijksmuseum*, Rijksmuseum, Amsterdam, Wanders. (English)

Corpus Wandtapijten part 3, by **Hillie Smit**, is in preparation.

Materials and suppliers

Polyester machine thread and buttonhole thread

Perivale-Gütermann Ltd.
Bullsbrook Road
GB - Middlesex UB4 OJR
tel 020 8589 1600
mail@guetermann.com
and haberdashery shops

Downproof beige cotton

Natural linen scrim
Whaleys (Bradford) Ltd
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Great Horton
Bradford
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tel 01274 57 67 18
www.whaleys-bradford.ltd.uk

Aerosol tapestry cleaning

De Wit Royal Manufacturers of Tapestries
Refuge Tongerlo Abbey
Schoutetstaraat 7
Belgium - 2800 Mechelen
tel 00 32 15 20 29 05
info@dewit.be
www.dewit.be



Fig 1: The wooden support frame on which the tapestries were originally nailed. The nails are still in place. Above centre are the signature of the builders of 1887. Below are those of builders who repaired the wall plaster in 1996.



Fig. 2: A wall panel lined with polyester film and edged with a cotton twill band in preparation for the mounting of a tapestry.



Fig. 3: A model of a wall covering attached to a wooden support frame by staples. The wall covering here is Tyvek. The centimetre gauge indicates the distance between the staples.

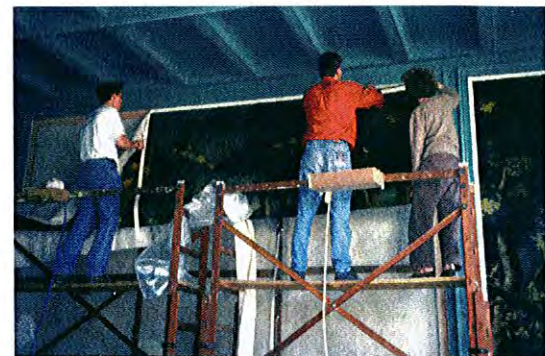


Fig. 4: The stapling of a tapestry to the wall. Mr. de Wit stands at the centre, the author to the right.



Fig. 6: The mounted tapestries with the original frames covering the edges in place.

Multiple Layers in Tapestry Conservation

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Conservation & Collection Care
Historic Royal Palaces

1. Introduction

Three years ago tapestry conservators at Conservation & Collection Care were presented with a small 190 x 96cm tapestry for conservation (Fig.1).

The tapestry was a bit of a mystery piece with little known about its history. It had belonged to the clients Grandmother and it was later found to have four cut edges suggesting that it was originally part of a larger piece, and with 18 warps per inch it was a very fine quality.

In order to find out a bit more about the tapestry the client consulted some Tapestry Art Historians who, through looking at photographs, dated it sixteenth century, and agreed that it was of a very fine quality.

The client was also told that the shield in the upper right hand corner (Fig.2) is not a weaver's mark, but must have belonged to the person who originally commissioned the piece. The shape of the shield as well as the design apparently lends itself to having been designed in Italy, and the tapestry was very probably woven in Flanders.

2. Condition assessment

The tapestry arrived at Conservation & Collection Care in a guilt frame with a glass front, into which it was to go back. The frame had no backboard and the Hessian lining from the tapestry was clearly visible.

When the tapestry was removed from the frame it was found to be nailed to a wooden stretcher by nails through a rotten replacement galloon that had been substantially attacked by moth.

The tapestry was carefully removed from the stretcher and the lining was removed from the back, so the tapestry's condition could be properly assessed.

The removal of the Hessian lining revealed a myriad of patches (Fig.3) including dyed blue linen, coarse jute and mattress ticking (Fig.4). The patches were layered on top of one another and had all been intensively stitched into the main body of the fragment.

The front of the tapestry showed that it was in poor condition with crude repairs and extensive coarse re-weaving, which was disfiguring as well as distorting. Upon closer inspection, it was clear that adhesive had been applied in places where it was extremely stiff to the touch, in particular the re-woven areas. There

were also areas that had been heavily painted with what appeared to be oil paint.

In some areas there were up to six layers of different materials, starting at the bottom with the mattress ticking, then the Jute, the dyed blue linen, then the tapestry and finally the adhesive or paint. In addition to this, around the edges was the moth eaten galloon. With all of these layers the tapestry demonstrated chemical, physical, aesthetic and biological problems.

The challenges the team were faced with were:

- How best to deal with the multilayered patches.
- To test to see if the paint and adhesive could effectively be removed.
- To chemically stabilise the tapestry and make it suitable to be given a full conservation treatment.

3. Treatment - patches

The very first thing we did was to remove and discard the rotten galloon.

We knew we wanted to wet clean in order to enhance the tapestry's appearance as well as to chemically stabilise the tapestry's condition. But should we keep the patches, the stitch repairs and the re-weaving?

It was decided that despite the fact the some of the stitching and re-weaving was disfiguring, the repairs were in general too substantial to remove without causing further damage to the tapestry.

The next step was to carry out wet fastness tests on the patches and repair threads in order to find out whether they could withstand the wet cleaning process. The tests showed no significant dye bleeding, so we decided the repairs could remain in place. The Jute however was found to be highly acidic, extremely brittle and powdered away with the slightest touch, so it was important that this be removed.

In order to minimise distortion and maximise the effects of wet cleaning we also decided to remove as much of the patched backing as possible. By cutting away the patches around significant stitch repairs we could keep the stitches in place and keep the tapestry in one piece (Fig 5). The process was well documented through photography and samples were kept of the all the materials.

With much of the reverse now accessible we could carry out further wet fastness tests on the original threads, which also showed no dye bleeding.

4. Treatment - adhesive

Next we tried to tackle the adhesive. We first tested various solvents by passing them through on a vacuum suction table. Solvents tried were IMS, acetone, white spirit, propan-2-ol and de-ionised water. The only solvent to make any

difference was the de-ionised water that made the adhesive tacky, but didn't actually remove it. This suggested that the adhesive was animal glue.

We considered that wet cleaning would at least soften the smaller areas of adhesive, but the top left corner of the tapestry was heavily re-woven and adhered and extremely stiff to the touch.

As all textile conservators know, warm water can aid the removal of animal glues, so in order to maximise adhesive removal in this particular area we carried out a hot poultice treatment (Seth-Smith & Wedge, 1996). The results were encouraging, there was a good amount of adhesive removal with the glue clearly visible on the blotting paper as it was removed, and the area was far more pliable after the treatment.

5. Treatment - painted areas

The painted areas were the next challenge. They were very thick and hard giving the impression of being oil paint. We tested first with a cotton swab soaked in de-ionised water that not only removed the paint but also revealed a familiar tackiness beneath it, indicating that it wasn't oil paint but in fact water based paint that had been applied over the top of yet more adhesive. It now seemed there were up to seven layers in some areas of the tapestry.

Figs. 6 and 7 are before and after images of the bottom right hand corner of the tapestry. In the before picture (Fig. 6) you can see that the corner had been painted over with green paint and the design of the tapestry was lost beneath it.

The de-ionised water and cotton swab treatment revealed that the far corner had been lost. In the after picture (Fig. 7) you can see that the paint was significantly removed to reveal the leaf design beneath. However the extreme corner was found to be adhesive which had been knitted together with a few fibres and covered with paint. The corner completely came away with the water having broken down the adhesive.

6. Adhesive samples

This loss of small adhesive "lumps" became more prolific as we worked our way through the tapestry and we were worried about the extent of fibre loss, and if in fact we were losing pieces of the tapestry.

We took an adhered fibre sample and looked at it under a video microscope (Fig.8 & 9). The sample showed no coherent weave structure, just simply a mesh of random fibres. These unattractive, potentially damaging repairs were possibly not original fibres to the tapestry, and were certainly not a cohesive part of it.

We continued further with the microscopy to see the nature of the fibres, which were confirmed, as being wool, having observed the characteristic scale pattern.

We also carried out a protein spot test. By extracting the adhesive from one of the samples and adding Bradford Reagent, we were able to confirm the adhesive was proteinous, suggesting that it was indeed animal glue.

7. Wet cleaning, stitch support & mounting

When the paint and adhesive had been removed as far as was possible at this stage, the tapestry was wet cleaned in de-ionised water with a detergent mixture of Synperonic N, carboxymethylcellulose and sodium dodecyl sulphate.

The fragment was tensioned along the warp to help prevent any shrinkage or distortion due to the intensive repairs throughout the tapestry. It was left to dry overnight.

A full linen support was applied across the whole of the reverse of the tapestry. Stitching was kept to a minimum, in accordance with the original estimate. However, throughout the fragment there were more “lumps” of adhesive dropping out, which revealed broken warps and holes, so more stitch work was carried out than at first envisaged.

As with so many tapestries a lot of the original brown wool outline had been lost and it was the clients request that we re-produce it. We agreed to do so only where we could find evidence (Figs.10 and 11).

Once the conservation was completed, the tapestry was given a replacement galloon edge and mounted onto a board ready to go back into the frame. Due to budget constraints we had to be economical with the mounting procedure. We used Gator Board covered with Moistop (or Marvelseal®) and attached the tapestry using Velcro®.

Finally the tapestry was packed up to be sent to the framers.

8. Conclusion

This was an enjoyably challenging project. From its arrival and the initial excitement of this beautiful little tapestry, to the revelation of all the different layers and thought provoking problems it was hiding.

I enjoyed the thought processes and discussions involved in overcoming the challenges of the multiple layers. The conservation stitching was a real lesson in discipline where work had to be kept to a minimum.

There was a great deal to be learnt from this project, and all involved were very pleased with the end result. But now that project is over, all I can say is ‘thank goodness it wasn’t any bigger!

Acknowledgements

I would like to thank the following:

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Kathryn Hallet

The Tapestry Team at Conservation & Collection Care

Lynsay Shephard

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IMS, Acetone, White Spirit, Propan-2-ol, Synperonic N, Carboxymethylcellulose, Sodium Dodecyl Sulphate:

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Gator Board (Acid free Fome-Cor)

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Holcombe Road

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Lancashire BB4 4NP

Tel: 01706 220917/22931

Fax: 01706 230222

Linen

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Tel 01648 42214

Velcro

AGF Supplies

Tel: 01634 290 939

Moistop/Marvelseal

Protective Packaging Ltd

Dane Road Industrial Estate

Dane Road

Sale, Cheshire

M33 1BH

Tel: 0161 976 2006



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

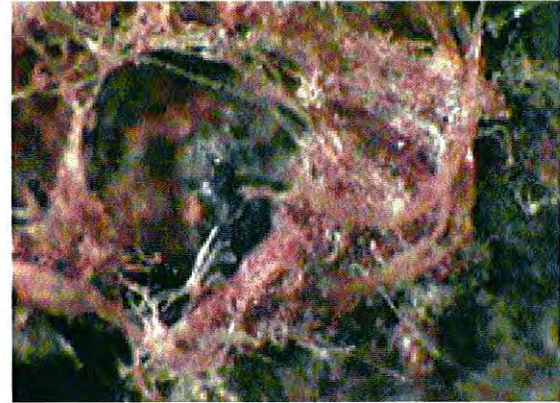


Fig. 9



Fig. 10



Fig. 11

Couching Stitch Patterns – Avoiding the ‘Tram Line’ Effect

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1. Introduction

Couching is a long established and effective conservation technique used to hold bare warps on degraded tapestry-woven panels to the support fabric. One of the main considerations concerns the spacing of support lines of couching. Unless the rows of couching stitches are placed very close together the stitching pattern will create a ‘tram line’ effect. This is particularly noticeable on finely woven tapestry panels covering upholstered furniture since the viewing distance when on display is generally much closer than that of a large wall hanging.

This brief paper presents a series of couching stitch trials undertaken on an eighteenth century Beauvais tapestry-woven chair cover from the from the Karen Finch Reference Collection at the Textile Conservation Centre, University of Southampton.⁴ The aim of the trials was to find the optimum stitching pattern that would reduce the ‘tram line’ effect without compromising on the amount of support required or increasing the amount of stitching.

2. An evaluation of couching stitch techniques in supporting tapestry-woven panels from upholstered seat furniture

2.1 Spacing of support lines and couching

The practice of couching areas of bare warps can create a satisfactory support and provide an aesthetically sympathetic integration with the extant weft. Fig. 1 shows a detail of couching stitching.⁵

The aim of a stitched support is to support the area with the least amount of stitching (for both ethical and economic reasons). The spacing of rows of couching required across bare warps of a tapestry panel displayed flat (e.g. hanging on a wall) is generally further apart than the spacing across bare warps of a tapestry chair cover. The main reason for the closer spacing is to secure the exposed warps in position when the conserved cover is manipulated into its 3-D position on the upholstered form, e.g. with corners and with changing planes as illustrated in Fig. 2. In areas of bare warps requiring folding and gathering it is particularly important for the distance between any two stitches

⁴This brief paper is reprinted from *Tapestry Conservation Principles and Practice*, Lennard, F. and Hayward, M., ‘Tapestry as upholstery: the challenges of conserving tapestry-covered seat furniture’ pp.113 - 122, Copyright 2005, with permission from Elsevier.

⁵The detail illustrated in Fig. 1 is from a set of eighteenth century Beauvais tapestry woven panels displayed on a suite of furniture (six armchairs and two sofas) at the Wallace Collection, London. The tapestry panels were conserved at the Textile Conservation centre between 1983 and 1993. TCC reference numbers 0573, 0738, 0936; (Hughes 1996; Gill, 1984).

on the same warp to be less than 12 mm apart as anything greater causes the warp to 'pop up' and become vulnerable to snagging. The spacing of support lines and couching stitching varied on the Wallace Collection top covers, depending on the condition of the area being worked. Across areas of completely bare warps support line spacing ranged from between five and seven mm apart, each support line couching every other warp (Fig. 1). In areas where warps remained covered by wefts the support lines were spaced further apart, ranging from between 7.5 and 12.5 mm; the couching stitches were also spaced further apart.

Although couch stitching provides effective support, aesthetic issues are raised in areas of bare warps. Unless stitching rows are very close together, on a finely woven tapestry with a high thread count, it would be difficult to avoid creating the 'tram line' effect exhibited in Fig. 3. This is particularly noticeable in large areas of silk weft loss and very noticeable at a close viewing distance.

2.2 Stitching trials

Four stitching trials were undertaken to find the optimum stitching pattern, i.e. one that would reduce the 'tram line' effect without either compromising on the amount of support required or over stitching an area. Different spacing of stitch rows and variations on couching over every other warp were explored. The trials were undertaken on an eighteenth century tapestry panel selected because it was comparable in weave count and fineness of weaving to the Wallace Collection suite set (8 warps per 10mm (20 warps per inch); 34 wefts per 10 mm (85 wefts per inch).

The four stitch trials are shown in diagrammatic form in Figs. 3 to 6. The spacing between couching threads along the length of one warp remains constant at 10 mm apart in trials one to three as shown in Figs. 3 to 5. The spacing is closer together in trial four, at approximately 7.5 mm apart. Please refer to Fig. 6.

The total number of couching stitches worked in trials one to three was almost identical. However, the stitch distribution varied: trial one (Figure 3) couches every second (alternate) warp; trial two (Figure 4) couches every third warp and trial three (Figure 5) couches every fourth warp. The couching stitches were distributed within a 10 mm section of warps for all trials although the number of rows differed for each trial within this section: there being two rows in trial one, three in trial two and four in trial three. Trial four (Figure 6) was different in that it combined elements from trials one and two, i.e., couching every second (alternate) warp with three to four rows of stitching per 10mm.

2.3 Stitching trial results

All four stitching trials held the supported warps securely. However, trial one showed the strongest 'tram line' effect across the width of the warps; trial three created a similar effect, but across the diagonal. The most successful trials from an aesthetic point of view were two and four as there was no discernable linear pattern (Figs. 4 and 6). This was achieved by spacing individual couching

stitches approximately the same distance apart between rows and between warps.

3. Conclusion

Trial two (Fig. 4) and trial four (Fig. 6) not only support the warps securely but also their stitching patterns reduce the 'tram line' effect. However, stitching trial two is considered the most successful as it is achieved with considerably fewer stitches than trial four. By stitching over every third warp in each support line within the same area, trial two has 57 stitches in nine support lines, whereas trial four which stitches over every second warp has 89 stitches. Trial two represents a considerable reduction in stitches, (almost 33%), and also in the time taken to complete. This could make a substantial impact upon the time taken to couch a full-size tapestry.

Acknowledgements

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Thanks are also due to the publisher, Elsevier and to my colleagues, Frances Lennard and Maria Hayward, for permission to reproduce this material which forms a contribution to their 2005 publication *Tapestry Conservation Principles and Practice*.

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Fig. 1: Detail of a finely woven eighteenth century Beauvais tapestry panel (after conservation) (© by kind permission of the trustees of The Wallace Collection) Compare the similarity of the support line and couching stitch spacing to that shown in Fig. 6.



Fig. 2: Detailed view of the front proper left corner of one of the Wallace Collection chairs (© by kind permission of the trustees of The Wallace Collection and Elsevier.¹



10mm

Fig. 3



10mm

Fig. 4



10mm

Fig. 5



10mm

Fig. 6

Images of the four stitching trials undertaken on sections of bare warps of the tapestry panel; Fig. 3, trial one; Fig. 4, trial two; Fig. 5, trial three and Fig. 6, trial four. The scale represents a 10 mm length (reproduced by kind permission of Elsevier).¹

Zardi & Zardi: making digital copies of the Venus & Adonis series of tapestries at Houghton Hall

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1. Introduction

In 2004 Zardi & Zardi were commissioned to make digitally printed reproductions of the Venus & Adonis series of tapestries that hang at Houghton Hall. This paper gives some of the background to the project and details the processes and costs involved.

2. Background

In 2002 David Cholmondeley gave to the nation in lieu of tax a number of tapestries that hang at Houghton Hall. Houghton is situated near to the North Norfolk coast and was built by Sir Horace Walpole – Britain's first Prime Minister – and it was he that in 1732 commissioned the four large tapestries from Brussels that depict the mythological story of Venus & Adonis. They remain at Houghton, which is open to the public, under the guardianship of the Victoria & Albert Museum and hang in the Green Velvet Bedchamber that also houses the magnificent state bed (by William Kent) that gives the room its name.

In 2004 the V&A received a grant to restore three of the four tapestries in the series, and as the date approached for them to be taken down and transported to Somerset to start the process of conservation, the question arose as to what to hang in their stead. The two alternatives under consideration at that stage were either to lend other suitable tapestries from the V&A collection, or to line the walls with a plain fabric.

By coincidence, at the same time that these discussions were taking place in the conservation department I was lurking in the V&A Image library sourcing transparencies of tapestries and other historic fabrics for the Zardi & Zardi collection.

Somehow a connection was made, and having shown some samples of our work to Lucy Wood at the V&A we were asked if it would be possible to make full size copies of the tapestries to hang at Houghton for the duration of the conservation project. Bearing in mind that the largest print that we had done at that stage was 1 ½ x 2 metres our response was an enthusiastic yes, but tempered by a little apprehension. So we put together a 'stepped' proposal that happily was agreed with the V&A and David Cholmondeley, and work commenced.



3. The Process

The process is made up of four stages:

3.1 Photographing the originals

I cannot over-estimate the importance of the quality of the original photography – without the highest quality input, the quality of the final work is inevitably compromised. The tapestry must be laid flat, the focus must be spot-on and the lighting has to be balanced.

For two reasons we were unable to photograph the tapestries in situ – first, the William Kent bed is enormous and occupies such a large part of the room that it is not possible to find a position for the camera, and secondly, two of the three tapestries that we were to reproduce hang in corners, which would render the final images virtually impossible to work with. So on this occasion we photographed the tapestries at the restorer's studio rather than on location.

3.2 Create digital files from the transparencies

This is the scanning of the transparencies at the highest possible resolution. It is possible to photograph the originals with a digital camera and therefore skip this stage of the process and save the cost involved. However we believe that to get the best results it is preferable to work from an analogue original.

3.3 Printing

The digital files were then sent off to the printers, and after some further CAD work (Computer Aided Design), the first print trials were completed, and a test strip sent off to Lord Cholmondeley for sign-off. There are various different

colouring methods used in digital printing – reactive inks, acid dyes, transfer printing and pigment – and there are also an enormous range of fabrics, which must be prepared for the type of printing that is going to be used. We use pigments because of their stability and (relative) colour-fastness, and a 100% linen which we have loosely woven for us in Scotland. Once we had received Lord Cholmondeley's approval we set to work on printing the first full sized facsimile.

3.4. Making-up

The cloth that we print onto is about 4 ½ foot wide and so technically we could have made up the first panel – Venus & Adonis - in two drops of fabric. However we wanted to avoid having the join down the centre, so we printed three drops, one large central piece and two smaller side sections. They were then made up in the same way that curtains are put together – lined and interlined, with a lead weight in the bottom to ensure a good hang. One of the crucial issues with the Houghton tapestries was that their final size had to be very accurate as the originals are framed top & bottom by cornice and dado, and on the sides by window and door frames.

The costs

For the most part the costs mirror the process and are as follows:

1. Photography
2. Scanning the transparency and making digital files
3. CAD work, and print trials
4. Printing and cloth costs
5. Making-up

The other variables that affect the final total cost are size, and reproduction rights. Size is self-explanatory – the larger the piece the more printing and material required, the higher the cost. Reproduction rights is a little more complex, but put simply if Zardi has the right to make further copies of the tapestries it means that some of the one-off expenses can be defrayed over future projected sales, rather than all being loaded onto one invoice. By way of example our trade price to make a full size copy of Venus & Adonis for which we do have the reproduction rights is £1,950 – if we did not have those rights I think that the additional charge (excluding photography) would be £500.

Practical applications

I think that there are a number of potential applications for using this technology:

- Temporary replacement for conservation or loan to exhibition
- Permanent replacement following sale or permanent loan to a public collection
- Filling missing section of original pieces
- Making copies in the 'original' colouring – by sourcing the colours from the threads on the verso side

Developments in the Cleaning of Tapestries, Chevalier Conservation, Paris France.

Susanne Bouret

Textile and Tapestry Conservator

Benjamin Heyman

Responsible for the Cleaning Laboratory

Many conservators and curators present here today are already familiar with the cleaning equipment, both past and present, developed by Chevalier Conservation. Some have visited the studios, others will have read the articles on the subject, the latest being a chapter in the book 'Tapestry Conservation: Principles and Practice'.

The aim of this presentation is to present the principle functions of the equipment and the developments made since its installation in 2001. The talk will be accompanied by a DVD that presents the equipment in motion. It is also the occasion to announce that a visit is currently being organized to the studios and cleaning facility in Paris for British conservators and curators.⁶

It is difficult for me to present the latest equipment without giving mention to the innovative, if not revolutionary equipment that was developed by Chevalier Conservation in the 1980's. At the time, I was a student at the Textile Conservation Centre and my experience of the wet cleaning of tapestries was custom made baths on the floor of the washroom. Lengthy, back-breaking work that gave satisfactory results in the appearance of the tapestry after cleaning but at what cost to the physical condition of the tapestry itself?

As part of my practical experience for the TCC I undertook a two-month placement at Chevalier Conservation where I had the opportunity to assist in the cleaning of tapestries. The advantages of their cleaning apparatus were numerous:

- the tapestry remained flat throughout the treatment
- manual interventions were still possible
- the duration of the cleaning treatment was greatly reduced

However, there were drawbacks:

- the tension of the screen was difficult to maintain due to the weight of certain tapestries
- the drying time tended to be lengthy
- the underside of heavily soiled tapestries remained so if they were not turned over

⁶ Sixteen textile and tapestry conservators visited the studios and laboratory on the 14th of September 2006.

The impetus for the development of this new equipment aimed to rectify these problems whilst improving the result of the wet cleaning treatment.

1. Description of the equipment

The screen is of a Teflon-coated fibreglass threads (19 holes per 10 cm) and allows a cleaning surface of 4 x 5.70 metres. Tapestries whose measurements exceed those of the screen can be rolled and placed in the "cradles" to the sides of the screen and cleaned in sections. A bridge enables the tapestry to be rolled onto the screen and provides easy access to different parts of the tapestry.

A mobile gantry can be moved the entire length of the screen (5.70 m) and is equipped with 12 regularly spaced nozzles through which water and air are passed under pressure (above the screen). Beneath the screen are another series of nozzles that allow for the rinsing of the reverse of the tapestry and two vacuum suction strips, high pressure suction that extracts the water from the tapestry and low pressure suction that assists in the drying of the tapestry. The gantry is also equipped with another, independent suction rack, both below and above the screen, which can be used to remove particulate soiling from the right and reverse sides of the tapestry before wet cleaning.

The vacuum suction strips/racks can operate on half the width of the screen if so required. A Webcam is positioned on the mobile gantry. The entire, or part of the cleaning process can be filmed, recorded or observed on line. A camera attachment facilitates photography and allows automatic grid coverage of the tapestry. The photos can be reassembled on the computer to obtain a highly detailed and defined image. Identical image centring allows for precise details of the tapestry before, during and after cleaning.

2. Programs and parameters

The cleaning program is set up individually for each tapestry and in relation to its size, the thickness of the weave, type of fibre, dyes, condition, level of soiling etc. and are programmed using the appropriate computer software.

Different sequences can be chosen from among the following:

- Removal of particulate soiling right and/or reverse
- Wetting out
- Introduction of surfactant or additives (buffers etc.)
- Rinsing (nozzles above the screen)
- Rinsing (nozzles below the screen)
- Removal of moisture (high pressure suction)

- Drying (low pressure suction)
For each sequence various parameters can be selected:
- Water pressure
- Air pressure
- Level of high pressure vacuum suction
- Level of low pressure vacuum suction
- Water temperature (up to 65°C)
- Concentration of the chosen surfactant

The chosen program is recorded on the computer and sent to the automaton, which directly controls the cleaning installation. The extracted water/moisture or effluent is analysed continuously for the following:

- pH
- Turbidity
- Conductivity
- Hygrometry

The results appear in graph form on the computer screen and are subsequently printed out and included in the conservation report of the tapestry in question. The average treatment time is 4 to 6 hours.

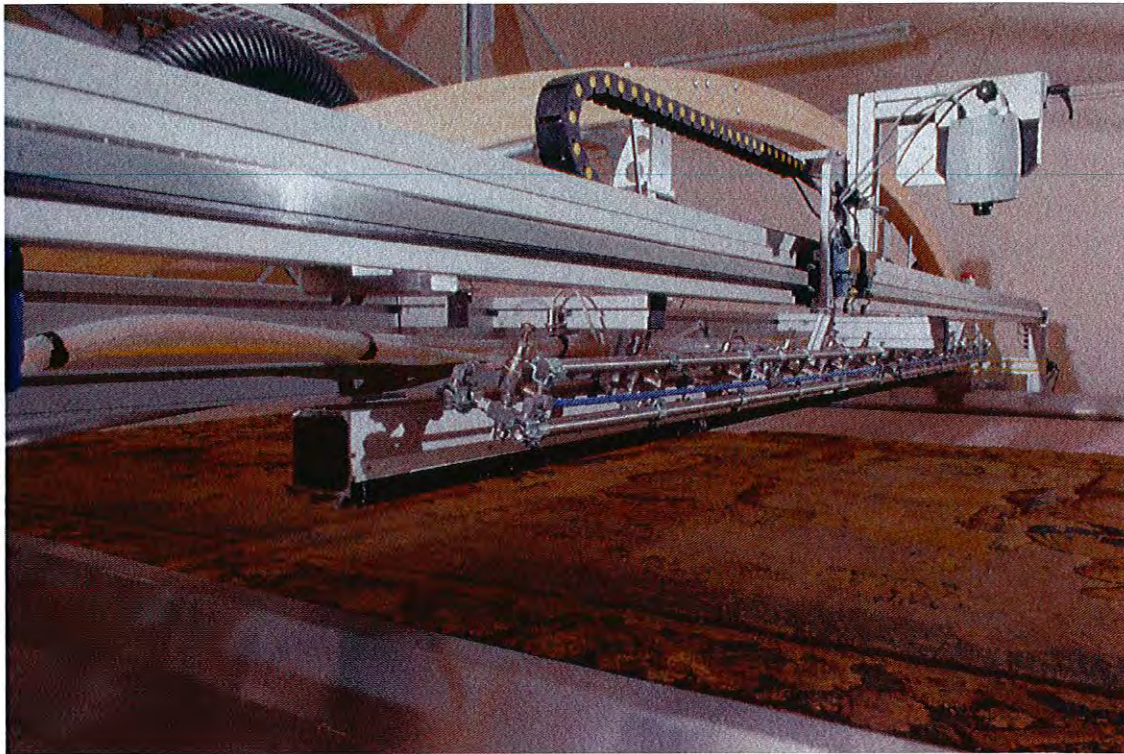
3. Water, air and surfactants

Deionised water is used exclusively and is heated. The temperature of the water is generally chosen in order to reach 20 to 25°C when in contact with the tapestry (thus heated to 30 to 65°C depending on room and water temperature). The water and air pressures can be between 0 and 3 500 mbar, which correspond to water flow rates of 30 to 300 l/h. Non-ionic and anionic surfactants are used, respectively for animal and vegetable fibres, sometimes combined in the latter case.⁷

The cleaning results are very positive and excellent results have been obtained.

⁷ Benjamin Heyman is currently undertaking research into the use of equipment, different surfactants and their concentration in relation to this cleaning equipment.

The greatest advantage of this cleaning equipment is believed to be the possibilities of adapting the various cleaning programs to the tapestry in question.



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The Development and Influences in the Care, Maintenance and Conservation of the Permanent Tapestry Collection at Hampton Court Palace.

Lynsay K Shephard ACR

Shephard Travis Textile Conservation Studio Ltd

The origins of tapestry *conservation* at Hampton Court Palace goes back to about 1880 when the tapestry collection's state of decay, the result of un-interrupted display from around 1700, was finally realized. It led directly to the setting up of the tapestry restoration workroom in 1912, within Hampton Court Palace, when the collection was recognized as being too valuable and fragile to be transported outside the confines of the palace.

This paper sets out to describe the approach to developments and changes in the repair and treatment of the Hampton Court tapestries during the twentieth century. The approach has continually strived to reflect the needs of a fixed collection, on permanent, open display and increasingly subjected to high visitor numbers and corporate entertainments within a highly competitive market.

The earliest tapestries at Hampton Court Palace were acquired by Cardinal Wolsey from about 1514. On Wolseys' demise and fall from power his collection of around 600 tapestries were appropriated by Henry VIII who continued to increase the number until his death in 1547. By this time there were more than 2,000 tapestries in the English Royal Collection including over 200 large, gold woven pieces. In 1592 the Duke of Wurtemberg, on his visit to Hampton Court Palace stated that the apartments and rooms were 'hung with rich tapestry, of pure gold and fine silk, so exceedingly beautiful and royally ornamented that it would hardly be possible to find more magnificent things of the kind in any other palace'.

The gradual dispersal of Henry's collection probably began soon after his death, though the acquisition of tapestries continued during the reigns of James I and Charles I. There are now about fifty tapestries in Hampton Court Palace, a small percentage of a once enormous collection, but still remaining one of the most important and significant in existence today. Most of the tapestries are on permanent display, with only a small number in storage.

The maintenance of the tapestries within the Royal Collection had been the responsibility of highly skilled specialists within the Royal Wardrobe until its closure in 1782. Often weavers in their own right, they not only cleaned and repaired the tapestries but also often wove new commissions for Royal and private collectors alike.

Current research has yet to reveal what is recorded about the care of the royal tapestries in the period between 1782 and the end of the nineteenth century. Around the early 1880 s, renewed interest in the tapestries, together with the aftermath of two minor fires in 1882 and 1884, led to the realization that action must be taken before the collection was irreparably damaged, even lost. In 1911 it was recognized that the care of the tapestries should be entrusted to the

'most competent people in the world' and therefore, in 1912 the William Morris Company set up a workroom at Hampton Court, with weavers from the Merton Abbey workshops, under the direction of the historian H C Marillier. Their remit was to wash and restore the tapestries, administer general maintenance and train apprentices.

For over half a century, the restorers diligently worked through the collection; however around 1980 the approach changed to that of conservation in both philosophy and technique. The reasons were multifarious but not least due to the recognition that the program of repair could not keep up with the rate of decay and that *restoration* as a concept was at best only superficially effective and at worst, it inflicted deliberate losses of evidence on the collection.

Few records were kept other than brief handwritten notes in a small note book recording the start and finish dates of individual tapestry projects and occasional staff changes. The first tapestries to undergo repairs in the new workshop, were the five early sixteenth century panels from the 'Dido and Aeneas' series. There are no records detailing the extent of the work other than the completion date of 1913. Extensive reweaving and extensions to some of the panels were carried out between 1703 and 1704 by John Vanderbank of the Royal Wardrobe (Fig.1).

Other than start and finish dates, records do not exist for any of the tapestries restored between 1912 and 1978.

By the late 1970s a new influx of graduate apprentices, with the support of the Royal Collection, determined that the restoration approach should change.

For a short period, and until the retirement of the last restorer, two workrooms effectively ran parallel to each other (Fig.2). One continued the use of restoration techniques on two tapestries, while the other, with guidance from the Victoria and Albert Museum's Conservation Department, formalised and developed a conservation approach.

The first tapestries to undergo conservation treatment, including wet cleaning, were two Mortlake panels from 'The Battle of the Solebay' series.

Woven around 1685 these tapestries had previously undergone extensive repairs during the 1920s during which a high percentage of degraded silk weft was removed and rewoven.

By the late 1970s the re-weaving was still fairly sound, however the dyes had faded dramatically, resulting in large rectangular areas of featureless woven silk (Fig. 3). By now, fifty years after the restoration treatment was completed, areas of untreated, unsupported original silk weft were in an advanced state of deterioration. Large areas had degraded and disappeared, broken warps hung from the tapestry structure. It is salient that in the 1920s when the restoration work took place, these areas were considered sound enough to be left untouched by the restorers.

Before the support work began, both tapestries were prepared for wet cleaning in the Victoria and Albert Museum's textile conservation workroom (Fig.4). Wet-fastness tests were completed and fragile areas were encased in a fine, nylon net.

Staff from Hampton Court (including myself) carried out the cleaning process using the cylindrical 'wash drum', together with V&A staff. Minimal handling during the wash process resulted in reduced silk loss to both large, heavy tapestries. The method was considered a vast improvement to the alternatives, open courtyards and make-shift baths, available to us at that time (Fig. 5).

With further guidance from the Victoria and Albert Museum's conservation staff, led by Sheila Landi, a treatment method was devised for the 'Solebay' tapestries. Both tapestries had a loosely woven, linen 'scrim' applied the back for overall support.

The scrim was attached by continuous lines of stitching 'scrim-lines' every 15cm, passing over one warp on the face of the tapestry and under by approximately 1 cm. This provided an evenly spaced grid system of parallel lines running vertically when hung. Between the 'scrim-lines' close conservation couching was applied throughout areas of weak and missing silk and wool weft. The couching was stitched over alternate warps with appropriate colours. The combined level of degradation and fine weave dictated that the couched lines were worked very closely in most areas of weakness and loss. Stronger areas were worked with more widely spaced lines and stitches. With the exception of restitching woven slits, areas of previous restoration and sound wool weft received little or no stitched support between the 'scrim-lines'.

For the first time the use of synthetic materials was introduced. Fine polyester threads, plied with silk or with wool were used for 'couching'. Single strands of thicker polyester were used for 'scrim' lines; woven slit stitching and all other applications. The silk/polyester blend, and wool/polyester blend was found to be most satisfactory both aesthetically and structurally. The polyester provided the long term structural support whilst the use of silk or wool retained the original aesthetic appearance and quality. The use of polyester and silk threads together provided strength and continued the traditional use of natural fibres.

On completion both tapestries were lined with pre-shrunk and scoured cotton sateen lining and were the first in the collection to be hung using Velcro contact fastener. The first completed was hung in 1982. The second, four years later had undergone similar treatment with the exception of the attachment of the lining along the lower edge as a means of lessening dust ingress.

During this period the tapestry workroom was amalgamated with the long established State furnishings workrooms forming the Textile Conservation Studios. A Head of Department and a Conservation Scientist were appointed, and further graduate staff recruited, several of whom had completed formal conservation training programs. A comprehensive program of collection care, maintenance, annual in-situ surface cleaning, condition surveys and environmental monitoring within the workrooms and State Apartments was

devised and established. The entire tapestry collection, previously hung using heavy duty press studs, was systematically refitted with Velcro® contact fastener.

The treatment of the first 'Solebay' tapestry was evaluated on its completion and before work began on seven 'Acts of the Apostles' tapestries from the Cartoon Gallery.

Similar support and strengthening methods were used; however the conservation couching was more widely spaced - a reflection of their stronger condition. Areas of weakness were smaller and more isolated; consequently some panels were given rectangular linen patches as an alternative to a full support, with parallel lines of discontinuous stitching between the scrim-lines, each line overlapping the previous slightly creating a 'brick-work' of structural stitching. These lines of stitching were sometimes 'zigzagged' so that larger areas could be covered by the same number of stitched lines.

In all cases a small excess of linen support fabric was allowed in both directions to compensate for the unevenness of the tapestry weave at the back and to allow for the necessarily closer stitching in weak areas. Grain-lines were matched carefully using drawn threads and stitched guidelines. Linen support patches became increasingly larger as the need for more overall support and even distribution of weight was required. The stitched support lines became more widely and evenly spaced, and a more substantial, closely woven linen support came to be used.

Preparation of conservation materials such as linings and supports became standardized and formalized as trials indicated optimum tensile strength. In house dyed fabrics and threads, together with pre dyed materials were quality controlled by standardized wet and light fastness tests by the Conservation Scientist as laboratory equipment and resources improved.

By the mid 1980s space and location had become inadequate and subsequently the workrooms and laboratory moved to spacious, well equipped rooms located on the north west corner of the Tudor Palace.

The new apartment, completed in 1987, presented a unique opportunity to design and install specialist equipment such as purpose built tapestry looms, tapestry hoist and padded sectional tables (Fig. 6). Following the Hampton Court fire the need for a tapestry cleaning facility was crucial for the safe treatment of the collection. Drawing on past experience and research led by the conservation scientist, a seven by eleven metre tank was built by Willards in a disused, converted greenhouse.

Designed to provide a safe method of cleaning the large, fragile textiles within the collection the wash bath provided a flexible approach with minimal handling and maximum control (Fig. 7). Later improvements included a moveable gantry, upgraded washing surface and fixed tensioning bars to the sides.

From the 1980s decisions made within the conservation policy were taken with the primary objective of achieving the best value in effective treatment, within a

timescale, that encompassed the whole textile conservation program. A tapestry conservation rolling program was established in the mid 1990s after a comprehensive condition audit of the collection.

This ran concurrently with the conservation and re-display of tapestries in the Tudor; Queens and Georgian visitor routes; the cleaning, conservation and installation of 12 tapestries damaged during the Windsor Castle fire, and with increasing pressure to compete within the commercial sector. For more than ten years the textile conservation workrooms were obliged to cover 50% of its running costs with income generated from external clients. The commercial pressures were not confined to the tapestry workroom. The studio ran three additional sections; furnishings, costume and the science laboratory – all expected to earn their own keep! The studio became highly successful in winning commissions from organizations, museums and private collections despite the remit that whilst operating within the commercial market, the studio was not allowed to undercut the competition! In the five year period between 1998 and 2002, 29 large scale tapestry projects were completed for external, fee-paying clients. During the same period eight tapestries from the Hampton Court collection underwent full conservation treatment, techniques and methods were subject to continued review and improvements to display, storage and installation were put in place (Fig. 8).

This was achieved by the equivalent of between two to six conservators working full time within the tapestry workroom and was in addition to numerous consultations, condition auditing, a full training programme and other aspects of the general maintenance program.

The conservation of the seven eighteenth-century 'History of Alexander the Great' tapestries from the Queens Gallery provided further challenges and development. The conservation of two large, partially restored panels from this series challenged the skill and ingenuity of the conservators. The method of applying 'close couching' in areas where little or no weft remains, specifically in darker wool areas, was re-examined and adapted to avoid visually disruptive 'tram' lines or 'twilling'. Two more panels confirmed structural damage caused by the use of small, intensively stitched patches to isolated weak areas (Fig.9).

Consequently, by the early 1990s, in order to provide long term stability, full linen supports were applied to the backs of most tapestries undergoing treatment. It is recognized that realistically, it is unlikely that the supports will ever be removed; however by identifying tapestries showing degradation symptoms sooner rather than later, the application of a full support to a recently cleaned tapestry, by means of minimal stitching could, in theory, be reversed. The more minimal treatment approach, involving full supports with less intensive stitch work is also attractive to private collectors when the value of the tapestry is far less than the cost of conservation or when finance is simply unavailable. To this end tapestries that might otherwise be lost forever can be treated with structural support systems that are affordable.

During the mid 1990s the tapestry condition audit categorized all tapestries both on display and in storage, and prioritised the conservation needs. Annual

condition assessments enabled any changes to be monitored and recorded using detailed photography and analysis rather than any written description that can be subjective.

The audit was fully functional by 1998, and a rolling programme was put in place that, in theory, not only prioritised the tapestries but also suggested alternative panels for specific areas of the palace, subject to size, date and location. In this way a rotational display could be possible, bringing tapestries out of storage that might otherwise rarely be seen. Tapestries requiring minimal structural support provide excellent projects for less experienced staff, developing knowledge and practical skills. In addition, the treatment is relatively fast and therefore more cost effective. By 1999 the prioritised treatment strategy highlighted tapestries that would form part of a formal training syllabus, leading to the first RCA/V&A and Historic Royal Palaces joint MA course in tapestry conservation based at Hampton Court Palace in addition to a three year tapestry internship, that after external funding was obtained finally began in January 2003.

Recent research such as the European funded MODHT will influence how tapestries are affected by display conditions and storage, how condition is categorized and how decisions concerning proposed conservation treatments are made. Already the results have shown that even the smallest fibre sample will provide a good indication of the overall strength.

The changes and developments that have taken place during the twentieth century have consistently reflected the needs of this important and significant collection of tapestries in terms of both maintenance programmes and ensuring the continuation of skills.

The requirements are of a highly specialized nature, requiring manual dexterity, strength and patience. The tapestry conservator needs to be a well organized master of many things including weaving techniques, tapestry history, environmental conditions, project planning, and organic chemistry in addition to a sound, in-depth knowledge of the textile conservation discipline. Above all, the tapestry conservator needs to have a flexible approach capable of development and change according to the needs of the collection, the tapestry or the client.

However, there is no place for experiment or mistakes on such rare, valuable and fragile textile objects. It is crucial that specialist skills and knowledge gained by years of experience is passed on further generations of conservators through training and coaching and that research continues to influence the future care and survival of these historic objects.

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Staff from Conservation & Collections Care, Historic Royal Palaces

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Fig.1 Tapestry 'Aeneas encountering his Mother Venus'. Dido and Aeneas Story, circa 1525

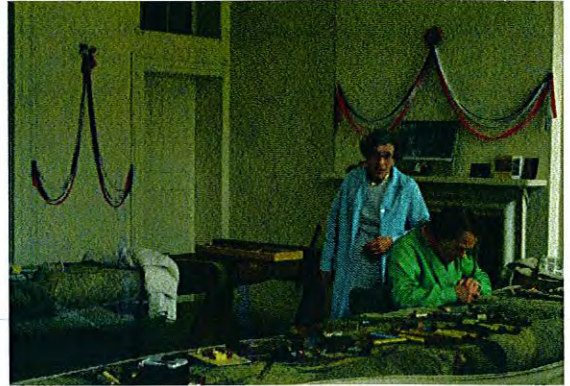


Fig. 2 Ida Turner, supervisor, and Betty Creasy in the restoration workroom mid 1970s working on two Alexander tapestries that were both placed in storage on the retirement of Mrs Creasy in 1980.



Fig. 3 'Dutch Fleet at Dawn' – Battle of the Solebay series.



Fig. 4 Wet cleaning in progress in the Victoria & Albert Museum's textile conservation workroom.



Fig. 5 One of the 'Alexander' series being wet cleaned in Stone Court, Hampton Court Palace, in the early 1990s.



Fig. 6 Tapestry workroom, Hampton Court Palace.

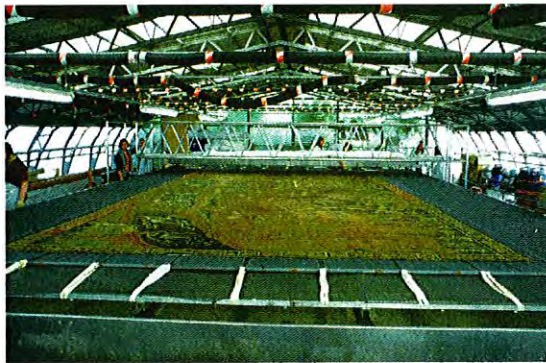


Fig. 7 Washbath, Hampton Court Palace.



Fig. 8 Tapestry installation, Great Hall, Hampton Court Palace.



Fig. 9 Previous repairs consisting of small patch showing surrounding damage and loss. Detail from 'Battle of Granicus', 'Alexander' series.

Is the Bird a Bustard?

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This paper is not about tapestry conservation treatment but instead it takes a look at the imagery encountered on a very attractive seventeenth century Flemish verdure tapestry I worked on recently. The tapestry depicts a typical verdure scene of a landscape with trees in the foreground and a village scene in the distant hills with the focus on a large bird in the centre.

The tapestry is quite narrow, 284 cm high and just 162 cm wide, with an 18-20 cm wide floral border (Fig. 1).

The bird portrayed is a Great Bustard, which was hunted to extinction in this country during the nineteenth century (Fig. 2). The paper attempts to show how accurately and recognisably birds may be portrayed in tapestries, and in the presentation a range of examples were shown, comparing the woven images with photographs of real birds.

Hunting has always been important, for essential food supply as well as for sport and entertainment. Hunting has been depicted since the earliest times, and features prominently in medieval tapestries.

The prime example is the fifteenth century set of hunting scenes in the Devonshire Hunting Tapestries at the Victoria & Albert Museum, which show clearly identifiable depictions of hawks, merlins, Mallard ducks, swans, and herons. A number of details from these tapestries were shown as examples followed by a series of images from tapestries of other periods with examples of other bird species, such as cranes, storks, pheasants, peacocks, and a parrot.

Seventeenth century Flemish verdures often depict scenes of countryside and hunting, and a Great Bustard would make a good theme for such a tapestry. This tapestry is quite small and may have been part of a set, the others of which may have depicted complementing scenes.

The Great Bustard, *Otis tarda*, once roamed the open spaces of Britain, notably the Salisbury Plains but also in Suffolk and Yorkshire until its extinction in Britain during the nineteenth century. At Audley End in Essex (an English Heritage property) a case of stuffed Great Bustards can be seen, which are some of the last shot on the Salisbury Plain in mid nineteenth century (Fig. 3). Populations of Great Bustards still exist in Spain, Portugal, and Russia.

The Great Bustard is a large and heavy bird on long legs. It is the heaviest flying bird but it can also run at considerable speed. The birds mature between 3-5 years, and can live up to 20 years of age. Mature males are considerably

larger than the females, as they continue to grow throughout their lives while the females stay at their first adult size (Fig. 4).

Great Bustards live in flocks of separate groups of males and females. In the mating season the males set out to prove themselves within the group, by showing off their strength and health in spectacular display fights (Fig. 5), and the successful males will mate with many females.

Great Bustards were keenly hunted and Henry VIII was so keen on the sport that he protected the species for his own pleasure. In the process of hunting the largest males were preferentially taken out. The species is slow breeding, with the female raising just 1-2 chicks a year, and this style of hunting eventually drove the bird to extinction in this country.

This large bird has long commanded great fascination and several attempts at reintroduction in Britain have been made. The Great Bustard Group was formed in 1998 to reintroduce the Great Bustards on the Salisbury Plains. Over a long period, each year a group of young wild birds are imported from wild populations in Russia and added to an increasing number of birds on the Plains. As the flocks grow and mature, it is hoped that a self-sustaining population will be created. So far, the scheme seems to be working and the existing birds are thriving.

The Great Bustard Group welcomes new members, who are kept informed of progress through a quarterly magazine. They arrange visits to see these birds in their introduction area. The address is:

The Great Bustard Group
1 Down Barn Close
Winterbourne Gunner
Salisbury
Wiltshire SP4 6JP
Tel. 07817971327

I have enjoyed exploring this theme, and finding out about this extraordinary bird. I would like to invite anyone who might be having trouble identifying a bird in a tapestry, to send me an image of it, so I might try to do so. I would be particularly interested in any other images of bustards in tapestries!

Acknowledgements

I would like to thank the following people and organisations:

The Great Bustard Group for their help and interest, and for showing me real live bustards, as well as providing me with some excellent images.

Gareth Hughes, curator for English Heritage for information on and for permission to use images of the stuffed Great Bustards at Audley End.

And finally, John Gardiner QC for the pleasure of working on this tapestry and permission to show it in this paper.

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Illustrations



Fig.1 Tapestry showing a Great Bustard



Fig.2 A detail of the Great Bustard in the tapestry



Fig.3 Stuffed Bustards at Audley End, Essex. The large bird in the centre is a large male Great Bustard; the bird on the right is a female Great Bustard, while the three small birds are a smaller species of bustard



Fig. 4 An injured Great Bustard in captivity with the Great Bustard Group.



Fig. 5 A Great Bustard 'displaying'. Photo courtesy David Tipling provided by the Great Bustard Group.

Le Corbusier's Tapestries in Chandigarh, India

Susanne Bouret

Tapestry and Textile Conservator
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In March of 2005 I was invited, along with the Curator of the Aubusson Felletin Tapestry Museum, Mme Michèle Giffault, to attend and participate in a seminar on the subject of Le Corbusier's Tapestries that hang in the Government buildings of the city of Chandigarh, Northern India.

The seminar was organised by the Alliance Française, Chandigarh and the French Embassy in India in collaboration with the Chandigarh Administration, APPROACH, (Association for Promotion, Protection and Revitalisation of the Architectural Legacy of Chandigarh).

The aims of the seminar were:

- To gain public, political, national and international awareness to the importance, plight and future of these tapestries
- To exchange historic, artistic and technical information on the design and conservation

The timing of this seminar was of particular importance as the inscription of Le Corbusier's architectural projects in the World Heritage Inventory of UNESCO was and is taking place.

1. Historical context

August the 15th 1947 is the date of the independence of India. It is also the date for the division of a nation into India and Pakistan and subsequently the division of the state of the Punjab, west Punjab and the city of Lahore became part of Pakistan and east Punjab part of India. The Punjab became a divided state without a capital.

The need for a capital was evident, the Punjabis were nostalgic for Lahore and the loss was acutely felt. After partition the population of the East Punjab had more than doubled due to the migration of Punjabis from the part of their State that had become part of Pakistan.

The government made the decision to build a new capital city to resettle those uprooted from West Punjab and set about to survey and select a site. In March 1948 the governments of Punjab and India approved a 115 square km tract of land in the Ropar district at the foothills of the Himalayas as the site of the new capital. One of the villages of this site lent its name to the new city. It was named after its Temple dedicated to the goddess of power, Chandi, adding "garh" which means fortress.

India's first Prime Minister, Pandit Jawahar Lal Nehru, was intimately involved in the project. On his visit to the projected site in April 1952, said,

"The site chosen is free from the existing encumbrances of old towns and old traditions. Let it be the first expression of our creative genius flowing on our newly earned freedom...Let it be symbolic of the freedom of India unfettered by the traditions of the past and expression of the nation's faith in the future."

In the 1940/50's very few Indians were trained in town planning. The search for the right person to lead this project had to be undertaken abroad. The first choice was the American architect and town planner, Howard Mayer, who was accompanied by other American experts in engineering, architecture and landscaping. He drew his inspiration for Chandigarh from a number of American residential projects whose plans counteracted the disadvantages of sprawling industrial towns by creating a city that is restricted in size and surrounded by green belts.

Another American principle prevalent in the U.S at the time was the idea of a basic unit or neighbourhood units. In the plans for Chandigarh these units were given the name of "Superblocks".

In addition to these residential areas Mayer planned the administrative area known as the Capitol complex, the city centre, the university campus and areas for business and industry.

The final plan assumed a fan shape that filled the land between two seasonal rivers. This "curving" plan reflected the American architect's desire to deliberately avoid the geometric grid. The Capitol complex was at the most northern point of the city and the city centre in the most central position. Located in the heart of the city linear parklands were continuous from the north to the south and a network of roads, surrounded the "Superblocks".

However these ideas were destined to remain in the form of architect's plans. In 1950 Howard Mayer withdrew from the project after the accidental death of his talented younger partner Matthew Nowicki.

The Government contacted Le Corbusier, artist, architect and urban theorist. It was this project that brought the Frenchman to India for the first time in 1951.

Although Le Corbusier made radical changes to Mayer and Nowicki's plans he did incorporate many of their ideas and the basic framework was retained: Capitol complex, city centre, University campus, linear parkland which he was to call the Leisure Valley.

Le Corbusier did away with the flowing, curved form of the city as imagined by Mayer, and introduced the grid system. For Le Corbusier the straight line was the logical path between two points and he felt that any forced naturalness was superfluous.

The city is divided into sectors, which replaced the “Superblocks “ of the initial plans. Each of the sectors provides accommodation for its residents as well as shops, schools, places of worship and community facilities. Parks cross each sector lengthwise. A network of roads was designed to make every place in the city accessible both quickly and easily and without having to drive through the sectors thereby providing them with autonomy, tranquillity and safety. The conception of the “sector” cared for what Le Corbusier saw as the four basic functions of a city:

- Living
- Working
- Care of body and spirit
- Circulation

Le Corbusier often compared his plan for the city to the human body,

The head – the Capitol complex

The heart - the city centre

The limbs – the University and Institutional areas

The Capitol, Le Corbusier’s “tour de force”, is situated in the north of the city and consists of: (Fig 1)

- The Assemblies
- The Secretariat
- The High Court

2. The Assemblies

The large cuboid building is surmounted by a hyperbolic drum, 39 metres in both diameter and height. The inspiration for this form was the cooling towers of the nuclear power station of Ahmedabad as seen from the aeroplane by Le Corbusier.

The Legislative chambers are to be found at the base of this “drum” and are lit by shafts of light. The building has two entrances, one for everyday use and the other from the piazza, via a massive enamelled door, designed by Le Corbusier.

The base of the building contains the independent volumes of the legislative chambers of the Punjab and Haryana states.⁸

The external façades are marked by the rhythmic pattern of the “brise soleil”, a sun shading device designed by Le Corbusier that has the effect of preventing direct sunlight entering the buildings thereby maintaining a cool temperature within. (Fig 2) The rhythmic pattern of the “brise soleil” plays with light and shadow on three sides of the building.

⁸ Chandigarh remained the capitol of the Punjab from 1954 to 1966. Both the regions of the Haryana and the Punjab claimed Chandigarh for their capitol. Since 1966 Chandigarh has become a Union Territory (UT).

3. The Secretariat

Designed as a workplace for 4000 people. Inside, each floor is organised as a long central corridor with offices on both sides. The balconies, "brise soleil", angled ramps and stairways relieve the possible monotony of this building that measures 254 by 42 metres.

4. The High Court

This building is composed of a large entrance hall, the Chief Justice's court and eight smaller courts, library and archives.

The "brise soleil" was also used architecturally on this building, but also as a metaphor of protection

5. Le Corbusier and tapestry.

It was in 1935 that Le Corbusier discovered the art of tapestry through the contact of the influential collector Marie Cuttoli. The discovery of this medium was a revelation to Le Corbusier who declared that " I have discovered in the medium of tapestry an opening capable of revealing many of my mural theories where my vocation finds "sa nourriture architectonique".

However it was not until 1948 that Le Corbusier developed his idea of the "Muralnomad" or nomadic mural. The concept was that the modern man was errant or nomadic and should be able to remove his interior décor and move it with him.

The presence and role of tapestry within the buildings of the Capitol of Chandigarh fell comfortably into this criterion whilst also answered to the ideas of visual and acoustic comfort that Le Corbusier desired.

5. The Tapestries of Chandigarh

The tapestries associated wool (noise-absorbent) with reinforced concrete (resonant) providing visual warmth with their vibrant colours and improving the sonorous quality of the buildings.

Nine tapestries were designed by Le Corbusier and woven in India in 1954 by the East India Carpet Company Limited of Amritsar and Cachemir, (later to become Oriental Carpets of New Delhi). to adorn the walls of the High Court.

Chief Justice's Court 12 x 12 metres

8 tapestries for the smaller courts. Each tapestry measures 8 x 8 metres (Fig 3)

In 1960 three tapestries were woven for the Assembly building by Krishna Carpets, Chandigarh.

One in the Deputy's entrance of the Assembly, now known as the Punjab Vidhan Sabha 5.6 x 24 metres

Two in the Council Chamber now named Haryana Vidhan Sabha that measure 7.5 x 21 metres and 7.9 x 19 metres.

These twelve tapestries represent a total surface measurement of 1098 square metres!

The initial idea of Le Corbusier for the weaving of the tapestries was that they should be a structured composition of rectangular units with a standard width that corresponded to those of the traditional Indian 4ft 7" loom (1metre 37 cm approx.). Each village of the region would receive the designs of different elements or rectangular units of the composition that were to be distributed to the families of that village for weaving. A "manager" would be appointed to coordinate the entire production.

This utopian idea, reminiscent of the teachings and theories of Gandhi, was doubtless too radical to be put into practice, for the tapestries were woven as single pieces. The 656 square metres of tapestry for the High Court were woven in five months, in time for the inauguration of the buildings of the Capitol in 1955!

The tapestries are woven in wool on cotton warps.

Warp and weft are of an S twist.

Warp counts vary from 5-6 warps per cm on the 9 tapestries for the High Court and 7-8 warps per cm on the three tapestries for the Assembly.

The warp is vertical on all the tapestries woven for the High Court and horizontal on the tapestries for the Assembly.

The weave is not that of tapestries woven on high and low warp looms but resembles that of the weave of Indian dhurries and they are referred to on most occasions and by most Indians as carpets. The warp is not completely covered by the loosely beaten down weft, and leaves the undyed cotton warp apparent in places. They are unlined and hang on wooden battens. Part of the upper edge of the tapestry is folded over the wooden batten and nailed in position on the front and back.

Despite the variations in size, all nine tapestries woven for the High Court were based on the same generic design – compositions of a geometrical, orthogonal order, "stressing the balance and precision appropriate to matters of law", with rectangles of flat colours animated by stylised motifs devised by Le Corbusier to symbolize Indian traditions, the culture of the Punjab and the philosophy underlying his design for Chandigarh. The fifty-three detailed drawings and sketches prepared for the weaving of the tapestries were accompanied by metaphorical descriptions of the themes, the motifs and colours to be used for each tapestry.

Generally speaking, the motifs symbolised intangible values of natural elements, manmade objects and abstract geometric shapes. Thus a tortuous curve was chosen to symbolize a meandering river whose "run may sometimes be very long, very agitated, very unreasonable, a meander of complications and complexities"; whereas a zigzag was "forked lightning, a thunderbolt, which expresses the instantaneous, the bursting, the lightning speed, the unexpected sudden flash".

Imprints of a human foot represent a “symbol of presence, a direction, of a race or a halt which can reveal the character of a person”

The hand “which contains so many lines and meanings in its shape and in its texture. The most hidden, the most secret, most subjective things, the most inaccessible can be revealed by the stroke, a line of the hand, its muscles and its shape.”

5.1 The tree as a symbol of perfection

The presence of “opposing forces” in life and nature is represented through the interplay of several ordinary geometric shapes. For example two vertically opposite triangles represent “a sign of tension, two ideas come face to face, opposed, as it so often happens in a conflict.

The background colours also symbolised human strengths and failings. The tapestry in the Chief Justice Court, for example, is predominantly red, symbolising action while its yellow and blue patches indicate light and space. White expresses serenity and clarity, green meadows and forests.

The three tapestries woven in 1960 for the Assembly are of a similar design but present an extended repertory of symbols.

6. Tapestries of the High Court

Chief Justice’s Court: 12 x 12 metres

8 tapestries for the smaller courts: Each tapestry measures 8 x 8 metres

The overall condition of the tapestries of the High Court is very poor. The furniture of the court room; filing cabinets, tables, chairs are placed in front of them and lean against the tapestries. They drag on the floor of the raised platform where the judge is seated. The parts of the tapestry that were designed to be folded back and sewn in position around the door through which the judge enters the courtroom have become unsewn and fall freely. In some cases these have been nailed in position. The sections of the tapestries that drag on the floor of the platform show many stains (tea, coffee and cleaning products). Particulate soiling in the form of concrete dust is evident on the entire surface of the tapestries and particularly so in the folds that have been created by the amputations of weave and in adapting the tapestries to the wall space after the later installation of an air conditioning system.

In order to accommodate the air ducts on the wall of the courtroom on which the tapestry hangs, the tapestry has been cut on three sides and appears to be folded back on itself. (Fig 4) The pipes of the air conditioning system are to be found on either the right or on the left hand side of the courtroom. The tapestry has been gathered like a curtain around this part of the installation creating serious folds. (Fig 5)

However the colours are in good condition and show little fading when the right and reverse are compared. This is a direct result of the “brise soleil” on the exterior of the buildings.

The tapestry of the Chief Justice Court was cleaned and restored in October/November 2004 by a team of conservators from the National Museum of New Delhi. The tapestry had been taken down from the wall of the courtroom earlier on in the year, according to a newspaper article, on the orders of the Judge, who apparently was allergic to dust and held the tapestry responsible for his suffering. The cleaning and restoration programme had been completed and the tapestry re hung when I visited Chandigarh in 2005.

6.1 Conservation/restoration of the tapestry of the Chief Justice's court

The condition of the tapestry (Fig. 6) was described as follows:

“In general the strength of the tapestries is fairly good and doesn't exhibit weaken areas. However the tapestry exhibit a number of cut openings. These cuts were made in the carpet where AC duct and other accessories were installed. As these carpets were hanged on the walls, the excess portion of the carpet at the bottom was folded according to the length of the wall. The folded portion of the carpet was lying on the floor, which resulted in gathering dust and dirt. Apart from this, water splashes, perhaps due to cleaning operations, resulted in the development of water stains and related stains. Brown stains were also noticed on the end portion of the carpets. As such the entire area of the carpet is affected by thin deposits of dust and dirt that had settled and entrenched in the meshes of the weave of the fabric. At some places some mild growth of fungus was observed.”

6.2 The conservation and restoration of the tapestry included the following treatments:

1. Removal of dirt and dust by vacuum cleaning.
2. Dislodging the enmeshed dirt particles from the weaves by dry brushing using soft bristled brushes.
3. Cleaning the carpet using aqueous and non aqueous method including solvent application for the removal of dislodged particles.
4. Reducing the dark stains
5. Anti fungal treatment
6. Re strengthening to all edges, cuts and losses by stitching and darning.
7. All edges of the tapestry to be reinforced by stitching with cloth strip.
8. Lining to the whole tapestry on the reverse side with nylon fabric to impart strength and to avoid direct contact from the wall while in hanging position.
9. The longitudinal edges of the tapestry are to be provided with a cotton strip to balance the weight of the carpet and to keep the carpet in straight position in hanging condition.
10. Spraying the fumigant in alcohol medium to prevent fungal and insect attack.
11. The cloth used as a wrapper is also to be sprayed with fumigant in alcohol medium to keep it free from microbial attacks.

The tapestry was wet cleaned in a purpose built bath on the floor. Softened water was used along with a “*mild detergent*” of which no details are given. Methanol was added to the water during the rinsing process in order to accelerate the drying of the tapestry. Paradichlorobenzene at 1% in an alcohol medium was sprayed on to the tapestry to be used as a fumigant.

When I had the opportunity to view the tapestry in March 2005, only three months after the completion of the cleaning and the conservation work, the quantity of dust observed to be present over the entire surface of the tapestry was astounding.

I also observed that dye bleeding appeared to have occurred in several areas of the weave, notably with the darker colours.

Plastic piping of inadequate width (2 cm) had been used to roll the part of the tapestry that dragged on the floor.

7. The tapestries of the Assembly

In 1960 three tapestries were woven for the Assembly building by Krishna Carpets, Chandigarh.

One for the Deputy's entrance of the Assembly, now known as the *Punjab Vidhan Sabha* 5.6 x 24 metres

Two in the Council Chamber now named *Haryana Vidhan Sabha* that measure 7.5 x 21 metres and 7.9 x 19 metres.

The tapestry that now hangs in the Entrance of the Punjab Vidhan Sabha is not the original. In 1994 the tapestry was removed from the wall apparently with the purpose of selling it. Newspaper articles from 2004 report that “it was sold off as junk”.

In 2005 a copy of the tapestry was woven following the original designs of Le Corbusier. The weaving took place in a village and was organised by the company Krishna Carpet. It was re hung in June 2005. (Fig 7)

The two tapestries that hang in the Haryana Vidhan Sabha are not the originals either, but copies. The originals do exist and were not sold although I was unable to see them or to find out where they were stored during my visit. Copies were woven in 2002 in an attempt to protect and preserve the originals, unfortunately the original designs of Le Corbusier were not respected and there are differences in their design.

The tapestries drag on the floor in the same manner as the tapestries of the High Court. Chair legs placed on the tapestry have damaged the weave. Stains were not observed but they present the same, important quantities of particulate soiling on the surface of the tapestry and in its folds. Tears in the weave are apparent on the upper edge of the tapestry and are most probably due to the hanging system, (folded over a wooden batten). (Figs 8 and 9)

8. The seminar

What had been asked of me for the seminar was to assess and discuss the condition of the tapestries and to put forward treatment proposals for their conservation, both active and preventive treatments.

The tapestries of Chandigarh are obviously a sensitive issue and a lively discussion ensued after my presentation and proposals. Reassurance was given that we were present at the seminar to share information and experience on the subjects of the cleaning of tapestries and their conservation.

The significant deposits of alkaline dust on the tapestries that come from the building itself appear to be an important conservation issue and one that should be treated in a curative and preventive manner.

It appears highly unlikely that the present air conditioning system in the High Court will be changed, however the hanging of the tapestries could and should be improved. The hanging mechanisms of all twelve tapestries should be reviewed and changed.

9. Plans for the Future

One of the tapestries from the High Court is to be exhibited in an itinerant European tapestry exhibition in 2007.

At the time of writing, negotiations are currently in progress to clean and possibly conserve this tapestry for the exhibitions. I hope to be in a position in the months ahead to present to members of ICON the cleaning and conservation treatment on the tapestry.

Acknowledgements

I wish to thank Bruno Plasse, Director of the Alliance Française, Chandigarh for all his help and energy that he put and continues to put into the protection and future of the Le Corbusier tapestries of Chandigarh.

My thanks go also to Kiran Joshi, Professor at the Chandigarh College of Architecture whose passion for the heritage of Chandigarh has no boundaries. To Mme Michèle Giffault, Curator of the Aubusson-Felletin Tapestry Museum. Finally to M. Michel Richard, Director of the « Fondation Le Corbusier.»

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Fig. 1

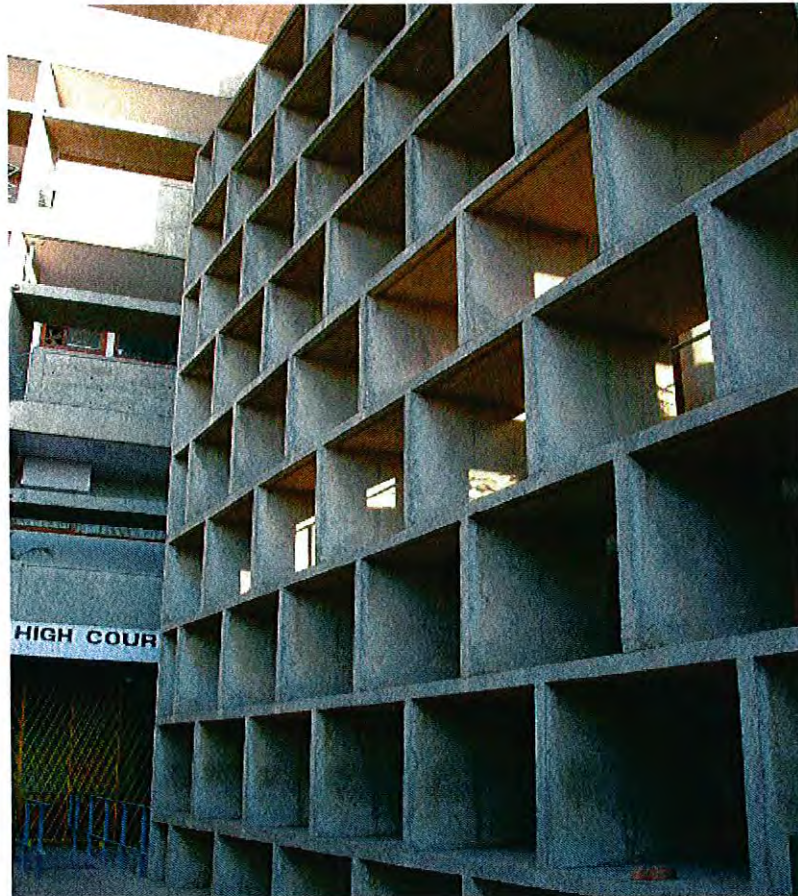


Fig. 2

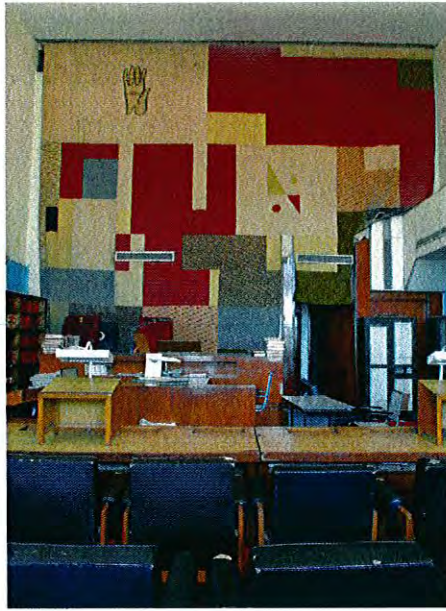


Fig. 3

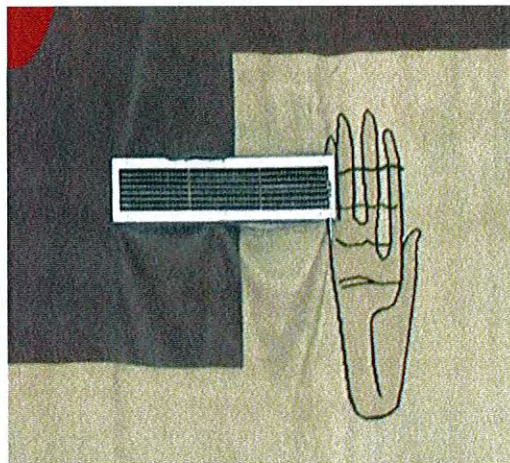


Fig. 4

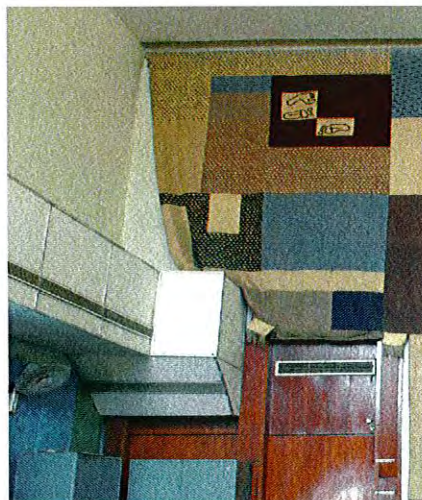


Fig. 5

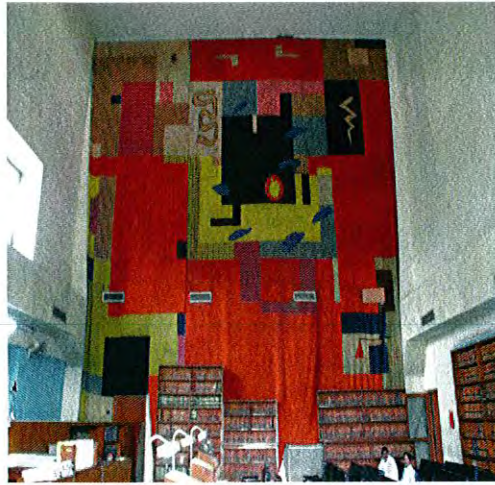


Fig. 6



Fig. 7



Fig. 8



Fig. 9

Back to Basics; The First Multi-disciplinary Tapestry Conservation Project In Japan

Mie Ishii, Yuko Fukuoka, Masako Saito, Makiko Yamazaki, Miki Komatsu, Mitsumasa Takanashi, Tamami Suo, Naki Kasasaku and Nobuko Kajitani (Tapestry Conservation and Research Project Team)
Toru Ishii and Fumie Sakai (Ishibashi Foundation)

1. Introduction

The Renaissance tapestry owned by the Ishibashi Foundation (Bridgestone Co. Ltd), Tokyo, is a rare example of a Flemish tapestry in Japan. It was in a poor condition due to permanent display. A conservation project was set up in order to research the history and fabrication, to analyze the condition and to implement measures to structurally sustain the tapestry for its long term preservation. The project also aims to establish means of theoretical textile conservation through multi-disciplinary collaboration among art historians, scientists and conservators. This poster presentation is to promote that a western tapestry is being conserved in Japan by introducing ethical and theoretical approaches developed in the west through a long history of tapestry restoration/conservation. Examples of technical analysis and the first wet cleaning of the tapestry are reported here. The four-year project is funded by the Ishibashi Foundation research grant.

The project plan is as below.

2004) Examination and research (history, technical analysis)

2005) Wet cleaning

2006) Restoration

2007) Support and lining, publication of the project report



Fig.1 The tapestry before conservation.

2. Technical analysis

Technical analysis was carried out in 2004 as part of examination and research.

2.1 Weave analysis

Table 1 Weave analysis

	Material	Spin	Ply	Thread count (/cm)	Colour
Warp	Wool	Z	3S	5-6	Off-white (undyed)
Weft	Wool	Z	2S	24-26	Red x 7, Purple x 2, Blue x 4, Green x 6, Yellow x 6, Brown x 7, Grey x 3
	Silk	I	2S	20-26	Blue x 2, Green x 2, Yellow x 3



Left
Fig.2 Detail. Hatching and slits are observed in Joseph's face, hair, hand and body.



Fig.3 SEM image of Sample WR1

2.2. Scientific analysis of fibres and dyes

2.2.1. Examination and observation of fibres

The fibres were identified by microscopic examination under optical microscope and scanning micro electroscop (SEM) (HITACHI S-2460N).

Results

- Wool: Flexibility remained. Scales were lost in some samples. Accretion was little.
- Silk: Flexibility of fibre was partially lost. Breaks and splits occurred. Accretions were observed on the surface. In general, the condition was poorer than wool.

2.2.2. Dye analysis

The dye analysis was carried out using High-performance Liquid Chromatography (HPLC) (SHIMAZU LC-10A).

Table 2 The results of dye analysis

Sample ID	Colour	Fibre	Dye (HPLC-PDA analysis)
WR1	Red	Wool	Madder
WR2	Red	Wool	Madder
WR3	Red	Wool	Madder
WO1	Orange	Wool	Madder + luteolin (yellow dye)
WY3	Yellow	Wool	Weld
WP1	Pink	Wool	Madder + luteolin (yellow dye)
WP2	Pink	Wool	Madder
WB1	Blue	Wool	Indigo
WB2	Blue	Wool	Indigo
SB1	Blue	Silk	Indigo
WB3	Blue	Wool	Indigo
SY2	Yellow	Silk	Weld
WR4	Red	Wool	Madder
WB4	Blue	Wool	Indigo

3. Treatment: wet cleaning

After material analysis and condition assessment, a treatment plan was drawn up. In this section, considerations for cleaning and the method carried out is discussed.

3.1. Examination

The tapestry was very dusty and brittle since it had not been washed before, although it may have been cleaned with a damp sponge or cloth since the reverse was soiled than the obverse despite the lining. Wet cleaning to remove the soil drastically changes both the appearance and chemistry of a tapestry thus pros and cons of the treatment were discussed.

The pros are

- soiling and oxidised products, which accelerates fibre deterioration, will be removed;
- flexibility and pliability of the fibres will be regained, and
- visual appearance will be improved.

Tests revealed that the fibres had enough strength to endure wet cleaning, and the dyes were fast.

The cons are

- deformation of the yarns will occur and the flat surface as seen off the loom will be a lost (an unwashed tapestry is rare)
- deteriorated weak fibres will be washed away.

After discussion with the owner, it was considered high time for the tapestry to be wet cleaned for the sake of long-term preservation.



Fig.4 The water was filtered through charcoal filter installed in the showerheads to remove chlorine. The filtered water flowed into the bath from the container where the temperature was controlled at 30°C.



Fig.5 The tapestry was sponged with surfactant foam. The foam was rinsed and drained. The centre was reached from a catwalk

3.2. Methods

The team designed and built a large bath in a garage of the Ishibashi Foundation premises in Tokyo. A strong catwalk was also prepared so as to reach the centre (Fig.5 & 6)

- Water was tested and since it was soft water, it was passed through a charcoal filter to remove iron and chlorine.(Fig.4) The water was heated to approximately 30°C for the surfactant Orvus WA Paste (3.5% solution) to work effectively.

- The surfactant selected was chosen because of its effectiveness of removing the soil, negative result on the bleeding test on the dyes and long experience of application on historic textiles. It was applied in foam with sponges and immediately rinsed away.

3.3. Results

The washing ended in good results. Soiling and oxidised products and were removed and the rinse water starting around pH 4.5-5 ended at pH 6.5. The stiff fibres regained flexibility, enabling the next stitch treatment for structural support. The aesthetic value was improved as the colours brightened up. On the other hand, partial loss of deteriorated silk and wool fibres, and dimensional and surface deformation of the tapestry occurred as anticipated.

In summary, using only basic tools, the first wet cleaning project of a tapestry in Japan was successfully conducted. This experience and knowledge is a great accomplishment for us.

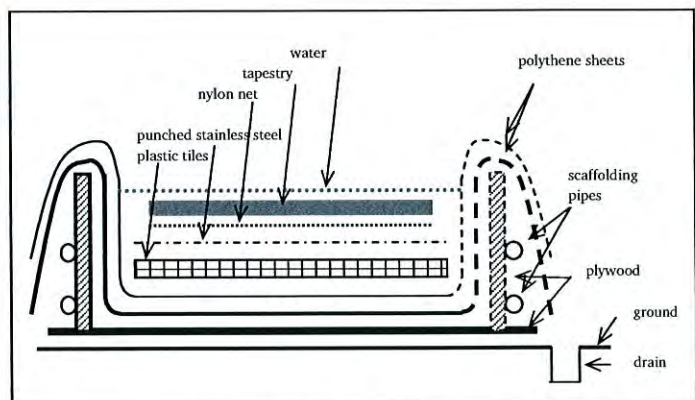


Fig.6 Cross-section of the bath. Plywood walls were stood inside the frame of scaffolding pipes. Plastic tiles with holes were placed on double layer of polyethylene sheets for water flow beneath the tapestry. Punched stainless steel sheet weighs on the tiles. The tapestry was spread on the nylon net for handling. The wall near the drain was removed to drain the water. (The front of the garage in Fig.5 is on the right of the diagram.)

4. Conclusion

After resting the tapestry for almost a year, the project will be followed by restoration, support stitching and lining of the tapestry. We hope to implement Western methods of tapestry conservation and increase awareness of approaching conservation theoretically in Japan. We plan to conclude our project with a publication in 2007.

Monitoring tapestries using engineering techniques

An interdisciplinary project

An interdisciplinary team from the Textile Conservation Centre and the School of Engineering Sciences at the University of Southampton is investigating the use of engineering materials testing techniques to monitor strain in tapestries. Textile conservators are experienced in visually assessing tapestries but are not able to quantify the strain imposed by a textile's own weight. In the case of a tapestry, this load is presumed to be a significant factor in its deterioration. An objective monitoring technique to inform decisions about conservation interventions would be of enormous benefit to the heritage sector.

The project aims to answer these questions:

- Can the strain imposed on different areas of a tapestry be quantified?
- Can areas at risk of imminent damage in a historic tapestry be identified before the damage is visible?

It aims to integrate research into the chemical and physical properties of tapestry materials. It is complementary to the Monitoring of Damage to Historic Tapestries (MODHT) project which focused on the characterisation of chemical changes in historic tapestries and the identification of markers of damage.



Learning about tapestry: research assistant Melin Sahin with Caroline Clark



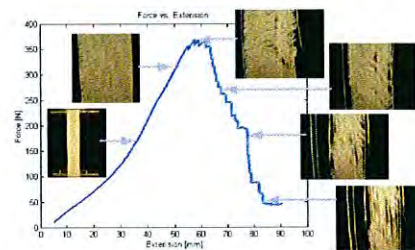
Learning about engineering: members of the team at a demonstration of photogrammetry equipment

Pilot study

A pilot study was funded by the AHRC Research Centre for Textile Conservation and Textile Studies and the University of Southampton's Annual Grants Scheme; each funded the employment of one post-doctoral research assistant for one year.

The study investigated the mechanical behaviour of a representative material, a tapestry-like fabric, and showed that the material behaves in a predictable fashion and can be monitored using engineering techniques.

The work examined contact and non-contact techniques, described in a paper for *Reviews in Conservation*.



Force-extension behaviour of tapestry-like material showing progressive damage

Further research

The results identified the most promising techniques for monitoring both the overall tapestry and individual points. Future research will aim to develop a system using the two techniques in tandem to monitor tapestries simply and unobtrusively in-situ. The results will be applicable to other large textiles.

The project team has also done some preliminary work on the use of different techniques to map and quantify the pressure inside pressure mounts.

We would be grateful to receive any comments or thoughts on both these issues.

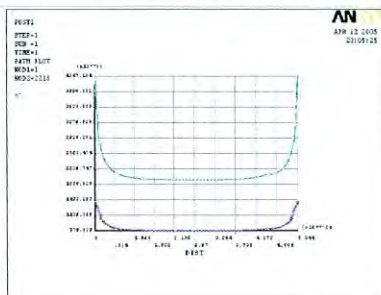
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An engineering approach to tapestry conservation

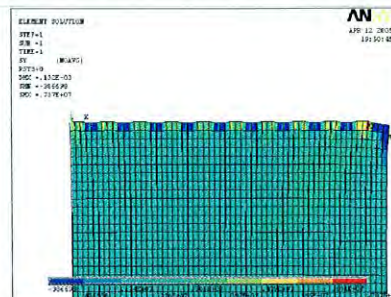
This poster illustrates work undertaken for a dissertation, part of a BEng degree at the University of Southampton. Computer modelling was used to analyse the effects of different hanging methods for tapestries, and a repair technique was also modelled. The author was working with a project team from the Textile Conservation Centre and the School of Engineering Sciences.

Velcro hanging method



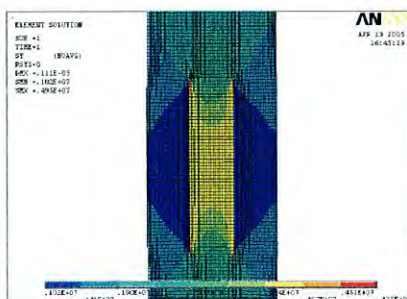
This figure shows that a hanging method such as a Velcro strip allows fairly uniform stress distribution. Highest stresses are achieved in the two corners but with added support in those areas little damage would be done to the tapestry. The turquoise line shows the stresses in the y-direction (the weft), which are much larger than those in the x-direction (the warp), shown by the purple line.

Press-stud hanging method



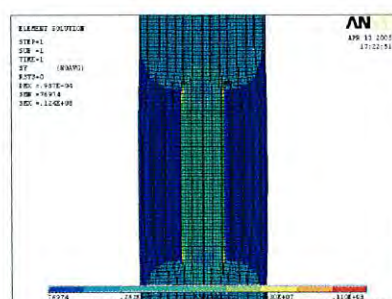
This figure shows a tapestry fixed with press-studs at irregular intervals. The press-studs act as localised loads on small areas, resulting in an increase in stress, shown by the green areas. In this analysis a stud was not included in the right-hand corner in order to investigate the effects of uneven fixation. The model shows that this would have an extremely detrimental affect on the tapestry as shown by the increased regions of maximum stress (red quadrilaterals). Not only does this affect the top edge of the tapestry but it also induces a pattern of increased stress below the area.

Linen repair patch



The introduction of a patch of a different material dramatically changes the distribution of the stresses within the tapestry. The maximum stress experienced in the tapestry has increased and the location of the largest stresses has moved to the corners of the patch.

Stiffer repair patch



Increasing the Young's Modulus of the patch material in the model has an immediately obvious effect on the stress distribution of the tapestry. The area affected by the patch has decreased. Although with a stiffer patch the stresses have decreased in general, the uneven distribution is a point of concern since the stress is focused into certain small areas rather than more evenly distributed throughout the weave. This means that the weakened area, which the patch is protecting, would barely move whilst hanging but an extreme amount of load would be put on the stitching of the patch and may weaken the previously strong areas which the patch would now pull on.

After an Apprenticeship at the Textile Conservation Centre at Hampton Court Palace and a first job working with Ksynia Marko at her studios in London, Fiona Hutton moved to the south west in 1989 and set up her own textile conservation studio with Frances Lennard.



Tablas and the Angel, Montecute House.

Fiona had a highly developed colour sense and a sometimes uncanny ability to estimate exactly how long a project would take to complete. These, together with her intuitive ability to conserve just what was needed and no more, helped earn her workshop a reputation for high quality, cost effective work.

Between 1989 and May 2005, when she died unexpectedly of heart failure, Fiona worked on over 850 projects, including embroideries, costume, ensigns, samplers and – her first love – tapestries; her very first project was a privately-owned tapestry and she was working on a set of tapestries from Houghton Hall in Norfolk when she died.

Between these two came many tapestries from great houses such as Arundel Castle and Eastnor Castle, from prestigious National Trust properties such as Uppark and Montacute and also other clients such as St Fagans and Kelmscott Manor.



Tapestry by Marta Rogoyska



The Triumph of Fortitude, Walker Art Gallery.



Fiona working on The Triumph of Fortitude at the TCC, Hampton Court Palace.



The Queen of Sheba from Eastnor Castle



Descent from the Cross, 16th Century tapestry from Montacute House, National Trust.

The working day of a textile conservator can be rather solitary at times and Fiona was naturally gregarious. In addition to her long-term partnerships with Frances Lennard and latterly with Alison Lister, she also shared her enjoyment of tapestries – and of life – working alongside many friends, recently qualified students, those about to join the profession and experienced colleagues.

Through them, her knowledge, her love of fine textiles and her spirit live on in the textile conservation community.

*'...the fastest
needle in the
West'*



Millefleurs by William Morris from Kelmscott Manor.



Judith and Holofernes from Eastnor Castle. Details of before and after treatment



The Installation of the Corryvrechan Tapestry

Sarah Foskett Textile Conservator

The Tapestry

The tapestry was commissioned as part of a scheme to integrate art into the Museum of Scotland. It was designed by Kate Whiteford and woven by the Edinburgh Tapestry Company (the Dovecot Studios). The title of the work refers to the notorious whirlpool to the north of the island of Jura and draws on the artist's fascination with signs and symbols of ancient civilisations.

Dimensions: 8m x 4m
Weight: 81kg
Materials: Cotton warp/wool weft

The tapestry was moved to the Hawthorden Court, Museum of Scotland and positioned over a void extending to Basement level.

The Method Statement

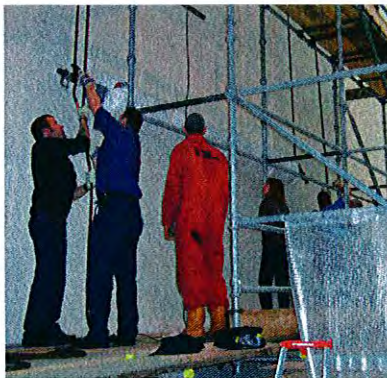
The method of installation was adapted from that described in Allen, R (1999): 'Some Observations on the Display of Large Scale Tapestries: Project Planning Attribution Management and Object Longevity'.

An independent lifting mechanism, via two pulleys attached to the top of the scaffold, were added due to the weight of the tapestry and the height at which it is to be displayed.

A Method Statement was written detailing:

- The equipment needed for the scaffold, battens and lifting equipment
- The preparation required in terms of securing the battens to the wall
- The method of installation
- A risk assessment

Copies of the Method Statement are available on request.



The Installation

The tapestry was rolled face up, velcro edge presented first. A scaffold pole was passed through the wrapped roller.

Pulley ropes were clamped to the ends of the pole.

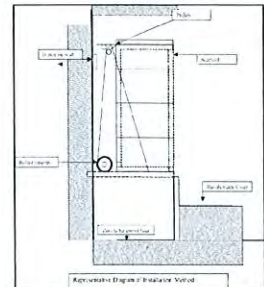
Webbing lifting tapes were attached to a batten on the wall and allowed to hang, pass under the rolled tapestry and back up to the lifting platform.

The rolled tapestry was gently and evenly raised – the ropes took the principal weight whilst the cotton webbing tapes guided and supported.

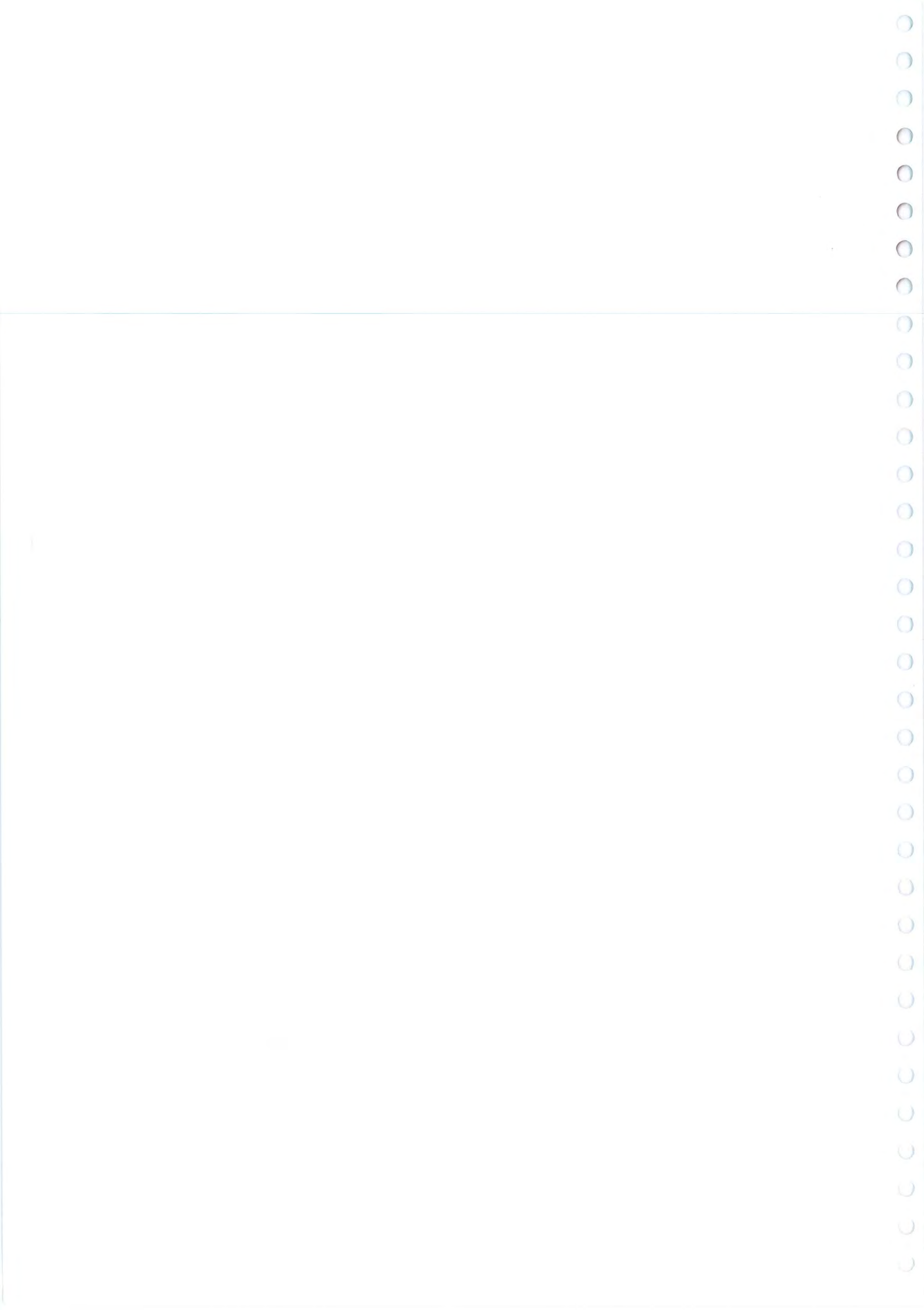
At the top of the scaffold the webbing tapes were tied off to cradle the roller. The tapestry was unwrapped and the Velcro secured to a batten pre-prepared with 5 rows of hard Velcro.

The pulley ropes and webbing tape ties were released and the tapestry was lowered.

The webbing tapes were cut approximately 40 cm from the bottom of the tapestry to facilitate any de-installation.



The success of the installation was largely due to the detail of the Method Statement and the good communication between those working on the project.



HISTORIC REPAIRS TO TAPESTRY: CONSIDERATIONS FOR FUTURE TREATMENTS

The very essence of a tapestry, the way in which it was made and its intended uses have resulted in the need for conservation and repair almost from the time of its manufacture. Indeed, it is often because of these interventions that tapestries have survived so well until now. The treatments have been carried out to differing levels of skill throughout the centuries to the point where, in many cases, they have become part of the tapestry's history and, hence, worthy of consideration in present day conservation treatments. However, past treatments may be causing deterioration and therefore need to be reversed where possible. There are many issues which need to be taken into account when evaluating the reversal or retention of past interventions. While it is recognised that there cannot be one comprehensive list of criteria that will cover every situation it is felt that a bringing together of the differing issues in one place would enhance the decision making process. Below is given a series of questions for consideration when faced with such decisions.

Aesthetic

- Are they marring the reading of the tapestry and spoiling its appearance?
- How can resultant missing areas be replaced and would this be any better than what is there now?
- Is there sufficient evidence to know how the tapestry should have looked?
- Does the tapestry belong in a specific place where it is an integral part of the interior decoration?



"Diana and Endymion" (privately owned). The marked areas indicate where patches from other tapestries have been inserted as infills for missing areas.

Ethical

- Is there a clear case for the removal of the historic repair?
- Have all concerned parties been consulted?
- Does the conservator concerned have sufficient knowledge and experience to make the final decision?

Sustainability

- Would the removal of the repair destroy evidence that could be of future use?



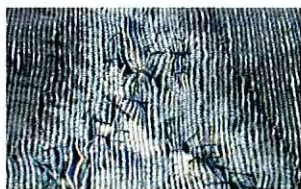
Areas of reweaving joining a patch from one tapestry into the field of another. Adhesive remains left from previously patched areas can also be seen.

Historical

- What is the significance of the tapestry and do the repairs have a relevance to it?
- Is the repair historically significant in terms of social history or conservation history?
- Is it a common repair or one that should be kept or fully recorded for future information?

Identification

- Is it obvious which areas have been repaired and how?



An example of stitching intended to hold the tapestry together but actually creating more harm.



The reverse of a tapestry showing the extensive use of patches to support weak areas.

Scientific

- May the repair, or the materials used, be of use to scientific research as to the nature of aging materials and methods?
- Can the repair provide any evidence as to the effectiveness of a particular method of treatment?

Mechanical

- Are the repairs structurally damaging to the tapestry?
- Are the repairs still effective or have they failed?
- Do the repairs interfere with the proposed conservation treatment? Which should be modified?
- What damage would removal cause?
- Will it cause further harm by leaving it?
- Could the repair itself be conserved without causing further problems?



Warp couching

Client Requirements

- What are the imposed limitations of the project in terms of time, money and staffing?
- What are the client's wishes? Have they been consulted?

Future Use

- Does the future use have a bearing on the decision – is the tapestry to be displayed or stored?
- What will the environmental conditions be and will they affect the materials used in the historic repair differently to the original?

In summary: What will be gained by the removal and what will be lost?



Detail from "Diana and Endymion" showing an area where a patch has been removed. The orange brown marks on the dog's back are adhesive remains on an area of very weak silk.

TOUCHING UP TROY: “War of Troy” Tournai, circa 1490

Albertina Cogram and Frances Hartog, Victoria & Albert Museum



General view of “War of Troy” (Museum number 6-1887) before treatment.

When this tapestry was assessed for treatment, the examiners were impressed by how well the numerous painted linen patches blended in. Though crudely painted, the suggestion of colour prevented them from catching the eye.

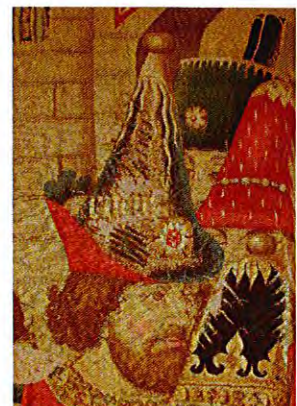
Though many of the linen patches were in a state of disintegration, it was decided that those that were strong enough should be retained. Indeed it was proposed that those that had to be removed should be replaced with similarly painted linen.

The support treatment has recently begun using a medium weight linen Holland in large areas of loss. Originally it was planned to use the linen in its natural state and paint it once it was in position. However, the greyish, natural colour of the linen was found to be wholly unsympathetic to the over all yellowish tone of the tapestry. The linen was therefore dyed to harmonise with the general hue – to great effect.

The question now is whether or not to paint the new dyed patches.



Painted patches before removal due to poor condition.



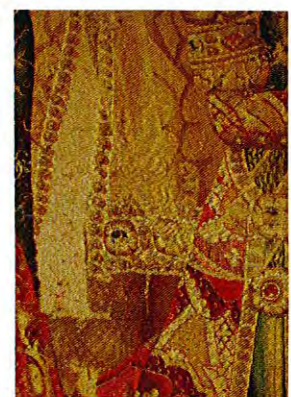
Replacement dyed linen patch, during conservation.



Painted patch from old restoration, to be retained.



Tapestry patch before removal due to poor application.



Replacement dyed linen patch, during conservation.



A method for the removal and installation of large tapestries using a vertical roller.

The National Trust Textile Conservation Studio has, over the years, devised a method for the removal and installation of tapestries, which uses a vertical roller supported at the base on a wheeled trolley. The trolley carries the weight and provides a good support, allowing large and heavy tapestries to be removed with minimal handling. Risks are therefore minimised to both conservators and objects.

There will be some situations where this procedure may not be appropriate e.g. in a stairwell.

1. Assess the working area. Choose appropriate equipment.

- Plan the moving of furniture, carpets and other objects.
- Protect any fixtures, fittings or flooring.
- Decide on the most suitable equipment for the job. This may be ladders, tower scaffold or fixed scaffolding.
- Carry out risk assessments specific to the site. Risks to both personnel and objects need to be considered.
- Ensure there is an adequate number of personnel to carry out the procedure safely.
- All personnel involved should wear hard hats and toe protector shoes. In addition goggles and masks should be worn if the tapestry is particularly dirty.



2. Assess condition and previous hanging methods.

- Determine if any areas require support before removal.
- Release lining if necessary.
- Check method of fixing. Hanging methods include the use of Velcro®, press studs, batten and sleeve, tacks, rings or a combination of fixings. The vertical roller method can be paused to enable rusted or difficult fixings to be removed safely.



Detail of Kings and Queen's tapestry, Houghton Hall. The headless tacks, hooks and rings had largely failed. The hang was therefore unstable and required reinforcement with Velcro tabs before removal.

3. Prepare the tapestry and roller with Velcro®.

- Position the ladder / scaffold in place in front of the tapestry.
- Ensure a gap is left between the scaffold and the tapestry for the trolley to move freely and for lowering and raising the roller.
- Release any tapestry fixings down one side edge.
- Pin loop Velcro® to the reverse in a straight vertical line down the side edge. Place pins horizontally with the point facing into the body of the tapestry.
- Attach corresponding length of adhesive hook Velcro® down length of roller.

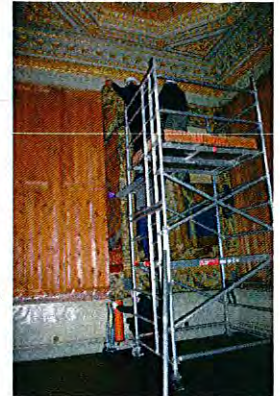


Re-hanging.

- Walls should be surfaced cleaned and made good. Where necessary, line with down-proof cambric.
- Prepare and fix in place a suitable batten to take hook Velcro®. The Velcro® should be attached to the batten at regular spaced intervals with stainless steel staples.
- Place roller vertical on trolley and position next to the hanging space. Mark on it the height of the hanging position.
- Roll tapestry onto prepared roller with top edge in line with this mark. This ensures that when the roller is raised to vertical the fixings on the tapestry and wall correspond.
- Undertake the removal procedure in reverse.

4. Removal from the wall.

- Prepare Velcro® ties, approx. 4 x 1m lengths.
- Position personnel as required. Those on top of the ladder / scaffold dictate the speed and turn of the roller. People on the ground move and guide the trolley whilst also turning the roller. A further person should observe the procedure from a distance, making sure that the roller remains vertical at all times.
- Place the roller vertically on the trolley.
- Match loop Velcro® on tapestry to hook Velcro® on roller. Press firmly together to prevent the tapestry sliding during rolling.
- Slowly release fixings as the tapestry is rolled with the front face on the outside of the roller.
- Once released from the wall and fully wound onto the roller, attach the prepared Velcro® ties around the rolled tapestry.



5. Lowering the tapestry.

- Tie a length of webbing tape to the top Velcro® tie.
- Lower the tapestry, taking the weight at the top until it can be supported and walked down to a horizontal position by the ground crew.



6. Re-rolling the tapestry.

- Identify a clean, clear space.
- Lay out tapestry on dustsheets and unroll.
- Unpin side Velcro® strip before re-rolling. Use a new roller and re-use the first roller for subsequent removals.



