Factsheet:
Caring for textile collections in museums

SCOTTISH MUSEUMS COUNCIL

Introduction

Textiles in museum collections vary enormously. They can be large and flat, for example banners and carpets, or small and three-dimensional like caps and purses, or all kinds of variations in between. They can be robust, and strong, or falling apart. This diversity can be very daunting, especially for those new to caring for textile collections.

It is important for those caring for collections to understand what causes damage to textiles, how to recognise the symptoms and, most importantly, how to prevent damage occurring. This factsheet explains how - even when all the odds seem to be against you.

Light

Light is necessary for visitors to enjoy exhibited textiles. Unfortunately, textiles are amongst the most light-sensitive of all objects in museum collections. Many textiles have been, and are being, permanently spoiled in museums because of a lack of appreciation of the destructiveness of light.

Fading of colours, alterations to hues and the consequential loss of detail can be easy-to-detect signs of light-damage. You may often need to look carefully to see this. It is always worth looking to note colour contrasts between an area that has been exposed to light and an area that has been protected. It is more difficult to spot the effect light has on the fibres and threads that make up the textile fabric, although loss of colour is a good indication of damage to these. In fact, it is this gradual loss of strength that is the most damaging effect of light. You may have noticed at home that it is the most faded folds of curtains that are the first to shred and fall apart.

Light-damage occurs progressively. First, items lose their flexibility, then they become weak and brittle, and finally they break into tears, fragments and, ultimately, dust. This process can be accompanied by general yellowing or browning of the textile, which is a useful indicator of poor state.

Prevention of light-damage is crucial for the care of textiles because, once damage has happened, it cannot be reversed. Conservators cannot bring back faded colours or return textiles to their original strength. Light-damaged textiles often require conservation treatment just to make them strong enough for a period of display.

Preventing damage from light
Even low levels of light cause damage – it just takes longer. Light damage is cumulative, so you have to make decisions that either reduce the amount (intensity) of light, or reduce the time of exposure.

Here is how you can reduce the risk of damage from light:

- Try to keep light levels at no more than 50 lux when displaying textiles. For most viewers, 50 lux is bright enough to allow visitors to examine textiles, but it is still low enough to prevent much damage to the textiles
- Only exceed 50 lux with good reason and for short periods
- Daylight is intense and variable. Stop it or reduce it with window-blinds and curtains
- Daylight is also rich in ultraviolet radiation, which is the part of light that does the most damage. Fortunately, we cannot see it and therefore do not need it to see textiles. So, eliminate it where possible by excluding daylight and reduce it from all necessary sources such as windows, fluorescent tubes, halogen lamps etc with filters. For textiles, the ultraviolet component of light should not exceed ten microwatts per lumen of the visible light
- Always plan the length of time for which textiles are to be exhibited – and keep to it! As a general rule, plan short display periods of no more than a year
- Measure the light falling on your textiles with a lux-meter or an ultraviolet monitor so that you can make an informed decision about how long each can relatively safely be displayed
- Determining the length of display is not an exact science, but remembering the following should help you to at least decide reasonable exposure times and levels:
  5000 lux for one hour is equivalent to
  500 lux for ten hours which is equivalent to
  50 lux for a hundred hours. In practical terms this means, for example, displaying a textile for five hours a day for twenty days at 50 lux
- Keep textiles in the dark outside visitor hours
- Store textiles in the dark and keep lights off when stores are not occupied
- Where appropriate, you should consider using ‘surrogates’, i.e. items not accessioned to the collection, or replicas, if you cannot restrict the light levels

Moisture and heat

Textiles, especially those made from natural fibres, absorb water easily. As they do so, fibres swell and become longer and, as they dry, they shrink and become shorter. The amount they do this depends on the fibres from which they are made. New textiles can do this without difficulty but old, already weakened fibres cannot, and will start breaking up.

Many textiles are dyed, or have coatings on the fibres, perhaps to make them stiffer or look better. These substances will move when a textile is wet and re-deposit when it dries, often resulting in damage.

If there are substances such as soap, dirt or acidic chemicals in the water and they are left behind as the textiles dry, these will cause damage such as colour change, stains, holes and embrittlement. Damage from inappropriate or accidental immersion in water can be easily spotted if you know what to look for. Some examples are: silks that are limp and lifeless because dressing has been removed; christening robes that are stiff at the hem because starch has relocated; samplers that are stained because dyes in embroidery threads have run. They have one thing in common: it is rarely possible for a conservator to return textiles damaged in these ways to their original state.

If textiles have accidentally soaked up dirty water, they will become stained. You may have seen 'tide-marks' on the lower edge of curtains that have been standing in water that has condensed on a cold window and collected on the sill.

Moisture in the air also causes swelling and shrinking of textile fibres. Repeated expansion and contraction of textile fibres causes internal friction in fibres and fabrics and so causes damage. The air in buildings can be very moist and very dry depending on circumstances. You have possibly noticed that air can feel dry in a heated room in winter. On the other hand, you may have found that the air is so humid in an unheated basement that curtains feel damp to touch.

Moisture in the air is humidity and its quantity can be very variable over time. The main cause of humidity change is change in temperature. As a general rule, when a room is heated, humidity falls and when it cools humidity rises. This is a key concept to remember in combating temperature and humidity problems in your museum.

As humidity changes, textiles absorb and release moisture from and to the air, to reach a state of balance with it. Fluctuations of relative humidity in a rapid succession over a long period of time in an uncontrolled environment cause different materials to separate. For example, the lifting of painted areas of a banner from the unpainted ground is often caused by humidity changes.

Moisture in the air causes other damaging processes. High relative humidity - often above 65% - invites mould outbreaks and pest infestations. Low relative humidity reduces moisture contents of textiles, leaving them brittle and dry.

Preventing damage from moisture and heat
Here is how you can reduce the risk of damage:

- Make sure textiles do not accidentally get wet, by keeping them in areas where water is absent and risk of flood is very low
- Do not wash museum textiles
- Monitor the humidity and temperature of the air so that you can learn what is happening in your building
- Keep the levels of relative humidity stable, always between 40% and 70% - above 45% and not exceeding 65%, for 90% of the time
- Establish a heating regime that keeps temperatures between 10°C and 20°C, and that also controls humidity
- Although low temperature discourages pests and mould, do not allow temperature to drop below freezing
- Avoid storing textiles in natural problem areas of a building such as dry and hot top floors and humid basements
- Avoid local problem areas. External walls can be damp and the vicinity of radiators and heaters too hot and dry for storing and displaying textiles
- Allow air to circulate by avoiding overcrowding in storage boxes and in hanging cupboards
- If necessary, use humidifiers or dehumidifiers to control the museum environment

Pests

Beetles, clothes moths, silverfish, rats, mice and even birds can infest textiles. Wool, silk, fur, hair and feathers are all sources of nutrition for certain insect larvae. Insect pests make irregular holes or graze the surface of textiles at random. They leave frass (droppings) and sometimes pupae cases on textiles. Further information on managing pests in museums can be found in *Integrated Pest Management*, Museums & Galleries Commission, 1998 (see section on further reading).

Preventing damage from pests
Prevention of insect damage is safer to people and the environment, and far easier and cheaper than using pesticides to cure a rampant infestation.

Here is how you can reduce damage:

- Keep the museum environment cool and dry
- Keep spaces clean, tidy and clear of rubbish inside and out. Cafes and other places where food is consumed and areas that are not regularly cleaned are especially likely to attract pests. Debris from roosting birds in gutters and roof spaces is a common source of infestation
- If possible, set aside an area away from the storage and display areas where incoming and outgoing objects are packed and unpacked and where suspect items can be quarantined by putting them in sealed, see-through polythene bags for observation or treatment
- Keep pests out of the collection by checking and, if necessary, by putting in quarantine new acquisitions; textiles that you have borrowed from other museums; your own textiles when returned from loan; and textiles that have been on display and are being returned to store
- Check regularly for infestation in all undisturbed, warm, dark places such as chimneys and fireplaces; ventilation ducts and grilles; under cabinets; attics and basements; and under carpets and curtains
- Keep doors and windows closed. If windows are opened in the warm months of the year, screen them with netting
- Create a pest monitoring programme, i.e. a routine of regular check-ups, in order to monitor the presence of pests in the display and storage areas of textiles. Use traps for monitoring their activity. Check and record the traps at regular intervals
- If you discover an infestation, identify culprit and source, then act immediately to contain it. If it is already spread throughout a whole room, you should seal off the area. Infested boxes should be sealed in polythene. It is easier and less costly to treat single items than whole collections
- Treat infested textiles by deep-freezing them. Details of this process are explained in the publication *Integrated Pest Management*, Museums & Galleries Commission, 1998 (see section on further reading), or can be obtained from a conservator
- Log all pest infestations and learn from them to prevent recurrence. If a textile has been infested, ensure that the fact is noted in its record
- If the building needs treatment to prevent repeat outbreaks, consult a specialist pest control firm for advice on suitable pesticides

Mould

Mould outbreaks occur in warm, damp environments when there is little air movement. If you find furry growth or scattered stains on textiles, this is an indicator of likely damage from moulds. Usually a musty smell in the air is a sign of risk of mould

Moulds are micro-fungi and there are hundreds of different species of them in our environment. During their lifetime, they produce millions of reproductive bodies called spores that are carried long distances on air currents. Mould spores are always present in the air but they only start growing in the right conditions

Given the right conditions, moulds will permanently decay or stain textiles. Once moulds are really established, the host textile can be broken down rapidly and the strength of the fabric lost completely

Mouldy textiles are a health risk because the spores can cause allergic reactions and even disease in some people. Dust masks, goggles, disposable gloves and overalls are recommended when handling mouldy textiles

Preventing damage from mould
Controlling the environment is the only really effective protection from mould. Although many treatments have been tried in the past, there is no real cure for mould once it is established in a textile

Here is how you can reduce the risk of damage:

- Keep relative humidity below 65% and the temperature below 18°C
- Ensure air circulation. Especially avoid putting storage boxes in contact with damp walls and over-packing boxes if there is the slightest risk of dampness
- Avoid spreading contamination. Do not unpack mouldy textiles near other objects or reuse boxes that have contained infected textiles for other objects. Wrap affected items in acid-free tissue paper to prevent spores spreading, while ensuring air circulation. Then contact a conservator for advice

Damage from materials in contact with textiles

Textiles come into contact with many different packing and display materials in museums. Unless these are known to meet conservation standards, they could pose a risk. Damage takes the form of faster degradation of fibres and dyes due to acidic conditions. The process is usually gradual and so you may not be able to see effects for a few years but, as with other chemical damage, it is irreversible

Particular culprits of damaging materials are poor quality card, paper and boards made from wood products. You may have seen samplers that have been mounted on hardboard twenty or thirty years ago that have gone brittle and brown already. Browning, yellowing and embrittling of textiles are generally a sign of damage from chemicals and vapours from poor quality materials

Many chemicals used in plastics, varnishes, paints, adhesives, dyes, inks, and self-adhesive tapes emit damaging chemicals. Reactions between two incompatible materials can result in a cocktail of damaging chemicals. Metals containing iron react with moisture from the air to cause rust that will stain and make holes in textiles that are in contact with these metals

Preventing damage from materials in contact with textiles
Here is how to reduce risk of damage:

- Select safe materials by choosing products that are sold by reputable suppliers as conservation quality materials, especially when choosing acid-free paper and card products. Use materials that are manufactured free from damaging chemicals, e.g. many archival polyethylene and polyester materials, such as Tyvek™, non-woven polyester sheeting, and Melinex™, colourless, transparent polyester film. Make sure that impurities are removed from cotton fabrics used as dustcovers by washing them to remove manufacturers' finishes
- Know and keep a record of the suppliers and product specifications of materials purchased, e.g. storage, boxes, display stands, tissue paper
- Make sure that you do not eliminate the effect of an expensive conservation quality box by using ordinary packing grade acid-free tissue paper inside
- Always select the best packing materials that you can afford. If you are unable to buy the best, for example you can only afford ordinary acid-free tissue with alkaline buffers, not conservation grade unbuffered tissue, then plan your priorities with a view to future upgrades. It is most important to use the most stable materials when they are to be in direct contact with textiles or in contact with textiles for long periods of time
- Make sure that display materials are suitable even for exhibitions of only a few months duration. Although display periods will be shorter than time spent in store, the presence of light can speed up chemical reaction
- Use barrier layers of Melinex™ or acid-free tissue paper to prevent direct contact if you cannot store or display a textile with a known safe material

- If you have to store other materials such as paper, plastics and metals with textiles, prevent damage to textiles by wrapping and interleaving the other materials with barriers such as acid-free tissue paper and Melinex™
- Keep a range of safe materials in stock

Dust

Dust is a fine, particulate airborne pollutant that contains a mixture of, for example, clothing and carpet fibres, soil particles, fragments of human and animal skin and hair, air pollution particles such as soot and ash, mould spores, paint fragments and pollen.

Dust freshly settled on the surface of textiles can be removed but in time it becomes embedded between textile fibres and so almost impossible to remove. Dust will disfigure, and can have a grinding effect like sandpaper on fibres. It can also harbour pests by providing them with nourishment - this is why pockets of garments should always be emptied out of dust and debris.

Preventing damage from dust
Here is how to reduce risk of damage:

- If you can afford them, use conservation quality showcases from specialist manufacturers designed to seal against dust
- Avoid open display whenever you can and have housekeeping regimes that ensure that all textiles displayed in the open, e.g. in a room setting, are cleaned at least each year using gentle vacuum suction by staff who have been trained to do this. Better still, use non-registered items for such displays whenever you can
- Protect textiles by wrapping and covering with dustsheets whenever they are outside display cases or boxes. All wrappers must be air-permeable - use impermeable plastics such as polythene sheeting only to protect textiles against water in an emergency
- Keep dust levels down in the environment generally through good housekeeping, especially of textile storage furniture and rooms
- Make sure textiles do not come into contact with dusty surfaces such as table-tops and box-lids. Use clean dustsheets placed over surfaces when laying textiles out for inspection

Handling, moving and touching

There are many times when textiles in museum collections will need to be moved, handled or touched, for example: for installing or dismounting an exhibition; for packing and transport; or for research and study.

It is when textiles are handled, moved and touched that they are at most risk of damage. This is because it is then that the compound weakening of textiles through light, moisture, dust etc, turn into actual tearing, fragmentation, snagging, loss and other visible and irreversible damage. It therefore goes without saying that care when handling, moving and touching is amongst the most important considerations when caring for textiles in museum collections.

The effects of accidental damage through handling and movement hardly need to be described because they are normally immediately obvious. Damage from touching, however, is usually gradual over time. Textiles absorb salts and fatty substances from skin and eventually they discolour, stiffen and weaken fibres. You may have seen brown, brittle, split areas of fabric in the underarm parts of historic dresses. Handling has much the same eventual effect - it just happens more slowly.

Preventing damage from handling, moving and touching
Here is how to reduce risk of damage:

- Avoid touching by wearing white clean white cotton gloves whenever you can. If it is necessary to touch the textile with bare hands, make sure they are clean. You should also make sure that everyone else – including researchers, other staff and members of the public - do the same
- Never carry or hold textiles unsupported. Move them in trays and boxes or closely wrapped in dust-sheets and make sure that they are not shaken, jogged, pulled or slid about
- People handle better when they cautious but confident that they are doing the right thing. Achieve this through training
- It is very tempting for members of the public to touch, handle and move textiles because it is hard to appreciate their qualities without it. Have designated handling collections of non-accessioned material so they can do so without damaging your collection
- Assess the risks of having the public or other untrained people handle accessioned textiles and supervise all such handling of accessioned material
- One of the most damaging times for textiles is when they are being put in and out of exhibitions. This is often because of pressures of time and the need to work alongside others in awkward spaces. So, plan installations carefully; do as much preparatory work as possible; make sure that you have all the necessary handling equipment; and keep workspaces as clear and tidy as you can

Caring for textiles in store

In store, you should aim to provide protection from damage from all of the threats mentioned previously. Information on storage methods and packing techniques are not covered in this factsheet, since the most important ones are identified and described in *An Illustrated Guide to the Care of Costume and Textile Collections*, Museums & Galleries Commission, 2000 (see section on further reading).

Preventing damage to textiles in store
Here is how to reduce risk of damage in store:

- Be especially vigilant about housekeeping in textile stores. It is easy to forget that stores need as much cleaning, checking and monitoring as the more public areas
- Try to avoid moving stored textiles more than necessary by locating research areas and workrooms nearby
- Make sure that stores are organised so you can find individual textiles quickly and easily and that they can easily be got in and out of their storage locations
- Plan sufficient space for growth of the collection

Caring for textiles on display

Textiles are much more vulnerable to damage at times when they are on display than when in store. On display, textiles need to be spread out, draped and hung to show them off and so gravity can be added to the list of potential causes of damage.

Preventing damage to textiles on display
Here is how to reduce risk of damage while textiles are on display:

- Examine textiles very carefully for signs of damage before exhibiting them. Avoid displaying textiles in a poor condition or in a condition that will get worse during the display period. Whenever possible, have condition assessed by a textile conservator at this stage
- Mount textiles in such a way that they are as fully supported as possible to avoid physical damage such as tearing or stretching
- Plan frequent changes of textiles that are on show. Frequency will depend on your assessment of the objects, the environment you can create and the amount of support you can provide
- Don't attempt to mount / dismount costumes or hang / take down larger textiles single-handed, and allow plenty of time
- Remove the temptation of touching by visitors by using barriers. The best ones are glass cases

- Use replicas or unregistered textiles as substitutes in circumstances where you want textiles to play a general role in the display but not to be specifically mentioned on labels. An example of this would be the shirt that just appears at neck and wrists beneath an 18th century man's suit
- Also use replicas and unregistered textiles for display in locations or environments that are unfavourable for the preservation of accessioned textiles. An example of this would be a line of washing drying before a fire in a cottage interior in a rural life museum
- Where textiles are in too poor a condition for a display, consider using photographs or digital images of them instead. This is not necessarily 'second best' because they can be used creatively in ways not possible with originals, showing views and aspects that you cannot achieve with the real thing

Next steps

Much of textile care is common sense if you understand the basic principles of care, know what causes damage and how to identify it. This factsheet has explained the basics of what you need to know and understand in order to care for textile collections in museums.

Depending on what you are aiming to do, next steps might be to:

- Learn some storage and display methods
- Learn how to monitor the museum environment and for pests in museums
- Purchase conservation materials and put them into use
- Learn more about the condition of your collection

Further information and advice

This is one of a series of factsheets, advice sheets and guidance notes produced by SMC on common collections care and preventive conservation issues. For more details, signposting to further sources of advice or information on how to contact a conservator, see our website at: www.scottishmuseums.org.uk

SMC also runs training days on the basic care of textile and costume collections.

Further reading

Benchmarks in Collections Care for Museums, Archives and Libraries, a self-assessment checklist
Resource, 2002

Standards in the Museums Care of Costume and Textile Collections
Museums & Galleries Commission, 1998
ISBN 0948630590

Pinniger, D. and Winsor, P.
Integrated Pest Management
Museums & Galleries Commission, 1998
ISBN 0948630639

Robinson, J. and Pardoe, T.
An Illustrated Guide to the Care of Costume and Textile Collections
Museums & Galleries Commission, 2000
ISBN 0948630957

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