

Tools and Methods for Handling and Storage of Museum Textiles

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Abstract

Textile museums exhibit exquisite historical evidence of our glorious past in the form of fabric, specimens, accessories, and robes. Textiles in the museum survived for so long owing to their proper care, handling, transportation, and storage conditions. Thus, we can understand the value of proper handling of museum textiles so that it is available to future generations for the viewing in the same condition as it is now. Storing ancient textiles is a challenge today, as they differ greatly in terms of content, structure, and adornment. It is quintessential to manage, store, and display costumes and textiles in a way that protects them from harm and does not expose them to unnecessary risks. In this context, certain tools are used for handling and maintaining such textiles, and this chapter unfolds the tools used for handling museum textiles. In addition, the transfer of costumes and textiles whether room-to-room or continent-to-continent should be carefully prepared and carried out with the necessary equipment and people. This chapter contains all the tools and protecting accessories to handle the textiles by museum personnel. Storage conditions, instructions for visitors, suggested personal clothing, care, and standard protocol during the transportation are written in detail. Few case studies regarding ancient textile conservation techniques, fabric, and chemicals used in museums is also presented.

Keywords: Textile museums, museum tools, textile artifacts, handling tools, ancient textiles

8.1 Introduction

There are several functions performed by museums. They collect artifacts, handworks, and handicrafts of various materials, often including precious materials, from different cultural backgrounds. The museum's objects have been categorized, transcribed, and obtained from various places. Some are displayed in continual galleries or transitory exhibitions, while others are stored carefully. Other aspects that make the museum a source of knowledge

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are preparing publications with well-researched information and making objects accessible to scholars. Nonetheless, a museum is an exhibition site and opens to the public for learning, amusement, or gratification. Textiles vary enormously in museum collections. Their historical interests, artistic attractiveness, and historical relevance are valued. Due to their broad appeal, textiles are often permanently displayed in most museums, particularly in historical museums. Textile museums are recognized for their historic attractions, artistic appeal, and cultural relevance. In museums, ancient or historic textiles, and crafted textiles, such as engravings, rugs, quilts, banners, apparels, curtains, upholstered chairs, dolls, and accessories, such as supporters, parasols, handcuffs, and bonnets, are stored. Museums bear a great deal of responsibility for the preservation, study, and display of cultural heritage. Particularly, historic textile is gaining more appreciation throughout the display of the material in museums. Culture and heritage conservation and its preservation is a multidisciplinary field that, on the one hand, requires close collaboration between archaeologists, art historians, curators of museums, and restorers. This is a prominent part, and in this area of study, a number of scientific papers have been provided [1].

The preservation of museum artifacts offers the choice among passive or active preservation methods. Passive conservation methods can cause damage or disintegration to the object. The use of integrative conservation methods to structurally preserve the artifact over time may lead to change in the mechanical and physical properties of the artifact [2]. In order to improve the quality of care and conservation of textiles and to guarantee continuous access to historical and cultural information, and the aesthetic pleasure it provides, necessary steps can be taken to manage, display, and store textiles safely.

8.2 Care, Maintenance, and Handling of Museum Textiles

Preservation, also known as conservation, encompasses all of the “dos and don’ts” that contribute to ensuring the life of the objects, whether they are on the window, archived or managed, studied or handled. In all conservation terms “care” and “monitoring” are used synonymously. Conservation in laboratory settings, on the other hand, refers to “radical treatment.” This process is usually designed to make the object resemble the original, often by adding new material and to stabilize the state of the object [3]. Fundamentally, preservation and conservation of works of art are studies of the object’s chemical, physical, and photochemical interoperability with other matter and aspects with which it comes into contact, and challenges to regulating the interplay between them in order to maintain the inherent quality of the object.

8.2.1 General Storage Factors

Long-term storage of historical items can cause materials to change structurally due to exposure to various conditions, such as UV irradiation, high moisture, and changing temperatures. Ultraviolet light promotes the oxidation of natural fibers, causing intermolecular bonds to rupture and microbial enzyme penetration. High humidity accelerates the attack and the degradation process consequently [4]. Although made of natural fibers, the microbial attacks and decay lead to discoloration, deterioration, and loss of structural strength.

Textiles, on the other hand, may also be the carriers of microorganisms, such as pathogenic or odor generating bacteria, and fungi [5]. Museum managers have been involved for a long time in the degree of fabrication in terms of antimicrobial protection of textiles to prevent biodeterioration [6, 7]. Light damage to specimens in historic houses and museums has risen in recent decades. With the availability of air conditioning to maintain an artificial temperature balance, there is little need to seal the sunlight into the room.

8.2.2 General Guideline in Handling

Fabrics should always be handled with care, and the use of protective plastic gloves is advised. The dressmaker's dummy is thought to be extremely useful during the accession process because it aids in providing a better fit for the product labeling. This could improve the way pruderies are handled. Unless the item has been registered, it will most likely be kept unless preservation is required and facilities are readily available.

8.3 Ideal Conditions, Temperature, Humidity

Depending on the current archive conditions, the storage practices were recognized. Ideal storage creates a nonchemical and physical environment in which objects are altered. The specifications are kept at temperatures ranging from 65°F to 70°F, with minimum lights ranging from 25 to 1000 Lux depending on the object type, maximum ultraviolet levels of 75 UW/lumen, and relative humidity ranging from 45% to 55% [8]. Even though microbes can attack almost any material, including synthetic polymers, historical textiles primarily made of organic materials are particularly vulnerable [6, 7]. Museums' physical conditions are currently being regulated, particularly in storage and exhibition space, including the establishment and maintenance of acceptable temperatures and relative humidity (16–18°C and 40–65 RH percent, respectively) [9, 10]. It is also a concern that natural fibers have varying moisture absorption and desorption rates, as well as uncontrollable local microclimate conditions, which may be the reason for contaminating the fibers.

8.4 Storage Units

Fabric fading can be accelerated by natural sunlight, as well as artificial lighting within period rooms, though Ponsonby [11] stated that opaque window shades can be used to completely darken the rooms. The museum's maintenance staff had to walk across the rugs and reach behind the curtains to remove the shades, which caused some abrasion damage to these textiles over time. Air conditioning and insect infestation protection should be controlled in the storage area. Spraying is best done with a vacuum and "fumigas 10" [12]. To monitor harmful light, direct sunlight should be avoided, ultraviolet filters can be installed over fluorescent lights, or low-ultraviolet pipes such as the Philips TL37 can be used. Storage areas should be inspected on a regular basis for insect infestation, lighting, and structural issues.

8.5 Storage Materials

The degree and the rate of degradation are dependent on the chemical and physical properties of the substrate, including the chemical structure, molecular weight, and crystallinity and the prevailing microbial pollutants. Many garments can be hanged and safeguarded with appropriate materials on padded hangers. For this application, the acid-free tissue or dacron fiber is ideal. If box storage facilities are necessary, very little hanging space should be necessary. It is made of nonsubstantial cardboard and measures 14 × 53 × 102 cm long [12].

8.6 Tools Used in Maintenance of Museum Textiles

The essence of the fabrics chosen and used by artists is one of the key characteristics of modern and contemporary textile art. The use of common fabrics, such as silk, wool, cotton, and linen, has spread to new and radical materials, such as plastic bags, rubber, and film, through modern synthetic textile fibers. Understanding, anticipating, and avoiding the degradation of these materials requires information that also spans conventional conservation fields.

8.6.1 Equipping the Workspace

The world's oldest dress, Tarkhan dress dating back to 3482 and 3102 BCE was excavated in the year 1912 to 1913 from one of the Egyptian mummies and transported to England's Victoria and Albert Museum for conservation. However, the packet containing the dress and other linen garments remained unattended till its rediscovery by the museum officials in the year 1977. The radiocarbon dating of the dress, done in the year 2015 confirmed its antiquity [13, 14] and exclusivity [15] in terms of pleated sleeves and designs. The use of conservation fabric was done on the golden linen V-neck Tarkhan dress as lining material before mounting it on the museum's mannequin (Figure 8.1). Proper handling, transportation, storage, and restoration work done by the art collectors and museum personnel made the Tarkhan dress a shining jewel in the Petrie Museum of Egyptian Archaeology at University College London. Handling precautions and equipment of the museum artifacts depend upon the collection scale and use [16]. Use of protective clothing is recommended for the art collectors and handlers as the collection and care can be unhygienic and messy work. Clean overalls, or aprons and clean white cotton gloves, vinyl and latex gloves, and dust masks are basic and useful requirements. Some of the basic items required for handling and restoring historical artifacts are listed in Table 8.1. Jewelries, such as rings, brooches, and chunky necklaces, should be removed before handling costumes or textiles as they present a risk of causing damage.

8.6.2 Housekeeping

The routine housekeeping practices are dusting and cleaning of the artifacts and the environment. Written cleaning procedures for protective clothing, gloves, dust sheets, and



Figure 8.1 World's oldest dress (3000 BCE), the Tarkhan dress at Petrie Museum of Egyptian Archaeology at University College London [17].

Table 8.1 Basic equipments and tools for handling museum textiles.

Equipment and tools	Function
Mount making tools	Object display and safety
Labeling tools	Identification tagging
Sealing equipment, Trimmers	To protect from dirt, making customize enclosures
Suction table/conservation platform	Used for repairing work
Cleaning equipments	Glass cleaning cloth, sponges, suede, towels, steamers, deodorizers
Washing machine and hand-washing facility	Washing of dust sheets, overalls, gloves, etc.
Cylinder type vacuum cleaner with adjustable suction	Cleaning stores and displays, etc.
Dust sheets	Covering, lifting, and rotating of museum textiles
Shallow trays of various sizes for lifting, gloves, forceps, etc.	Segregating, preventing loss
Plastic sheets of conservation quality and papers	Lifting, turning, moving during the inspection
Thermo hygrograph, whirling hygrometer, lux meter, ultra-violet monitor, insect trap, deacidification spray, etc.	Humidity, lighting, temperature conditions, and pest activity monitoring in the museum

appropriate quarantine measures must be followed. Regular good housekeeping tasks practices, evaluation, and checks ensure proper maintenance of museum artifacts [18].

8.6.2.1 *Cleaning the Collection and Environment*

Cleaning is an important activity everywhere. Museum cleaning staffs usually takes responsibility for daily cleaning of the museum site but some cleaning activities especially in object store are best integrated into the collection care program. Ancient textile being organic in nature is susceptible to damage due to light, heat, moisture, pest, mold, and environmental pollutants [19]. Some basic equipment and tool for space cleaning is the adjustable suction, cylinder type of vacuum cleaner a good range of nozzles, and soft brushes. This equipment handling requires good practice to a deep clean storage area and display galleries at least twice a year involving vacuum cleaning space behind and under the furniture, plinth, and cases. Pest is another significant threat to the textile collection. There is a number of creatures that can cause damage to the fiber of textile material. Pest activity vacuum cleaner bags should be removed after each use and disposed of sealed in a polythene bag. Delicate and necessary content should be carefully removed before vacuuming the interior surface. Shaving brushes and bed brushes are useful for brushing scattered pieces of remains into the suction stream to avoid damaging the surface of display boards.

A useful guide from a conservator regarding costume displays in room settings may be sought. To seek further advice on historic interiors, National Trust Manual of Housekeeping may be contacted [20, 21]. Cleaning is necessary to protective clothing and dust sheet sailed overalls aprons and gloves should be washed after every use, preferably with lukewarm water using bleach-free nonbiological and biodegradable detergents. Dust-sheet used in close contact with objects should be boil washed without adding any detergent. Taking proper safety measures, incoming objects made of wool, fur, or feather and any object showing sign of pest infestation must be separate from other objects to carry out careful monitoring and treatment if infested. Quarantine also involves sealing objects in cleaning polythene bags or sheets [22]. It is best practice to build quarantine measures into your object entry procedure.

8.6.2.2 *Basic and Best Practices for Checking and Monitoring in Museum*

Making routine checks of the collection, environment, and managing the organization go hand in hand. Integrated managing and monitoring of the environment, checking for pest control, and maintenance of the hygiene in the museum are part of the inspection practice.

8.6.2.2.1 *Premises and Facilities*

Regular checks of galleries and stores are required to maintain the cleanliness of walls, windows, blinds, lighting, and the environment and thereby help in conservation measures. Regular checks of ancient textiles in a museum prevent the damage and ensure taking preventive measures. Faulty water pipes fitting and sources of pest infestation are the source of immediate danger that must be identified and avoided.

8.6.2.2.2 Environment

Routine monitoring of temperature, relative humidity, visible, and ultraviolet light are necessary basic practices to be followed at least weekly for ancient textile museums. Routine checks of visible light levels and their variability are necessary several times a day. Annual checks of the performance of ultra-violet filters should be measured. Inappropriate relative humidity, temperature, and pollution promote fungal growth in museums [2].

8.6.2.2.3 Pests

Continuous checking and monitoring of integrated pest management (IPM) program need to be implemented in textile museums. Monthly checks for evidence of cricket activities especially in spring/summer, including inspection of debris from cleaning under units, corners, and on windowsills must be routine practice.

8.6.2.2.4 Furniture and Basic Practice Containers

Annual maintenance is required to check the stability of racks, the functionality of locks, cupboard sliders, door closure, hinges, etc. Condition of storage boxes, tissue paper sheets, and spaces quality and requirements essentially need to be checked annually.

8.6.2.2.5 Overall Management of Museum Condition

Annual check of inventory records and regular update of large collections is essential. Full condition assessment of all objects going to and from display on a routine basis is necessary, depending on the degree of risk. As a basic practice, collection conditions and monitoring need to be commissioned every 5 years.

8.6.3 Materials and Supplies

Materials required to clean and maintain the collection needs to stock in any museum at all time. Table 8.2 presents a guide to the materials required for handling of museum textiles. Another prerequisite is to have conservation quality materials used for storage and display of the collection.

8.6.3.1 Handling

Museum collection needs some handling for regular cleaning regimes, storage, and display purposes. Handling is done by trained museum professionals following good working procedures (Figure 8.2). Gloves are always worn when in contact with textile objects. The need to touch objects is quite small if basic materials required for handling textile artifacts are used appropriately. Common materials, like sheets of tissue, fabric, forceps, and transparent sheets, are usually used to improve the quality of handling and eliminate the need of touching the objects while handling [23].

Table 8.2 List of useful materials for proper storage/rolling/packing of textile artifacts.

Material	Function
Unbuffered acid-free tissue paper sheets and rolls.	Packing and in interleaving
Unbleached, undyed cotton fabric ('calico'), in various widths and weights. Must be sterilized/boil washed before use.	General protection and support to be used in direct contact with textiles
Polyethylene foam ("Ethafoam," "Plastazote").	Support mounts
Woven tape for sewing in	Labels tying for identification marks
Spun-bonded polyester padding	General-purpose padding
Spun-bonded polyolefin sheet ("Tyvek").	General protection and support, tie-on labels
Thin polyester and nylon film	Protection and support, lifting, making lightweight tubes for storage.
Cotton hosiery stockinette tube	Covering of mannequins arms and costume hangers
Conservation and museum quality acid-free boards.	Mounting and framing of textile wall hangings for support
Acid-free corrugated cardboard ("Perma"/"Dur board")	Making boxes, trays, support forms, and boards
Polyethylene boards	Boxes for storage and transporting artifacts
Velcro' fasteners	Display of textiles
Laminated barrier film ("Moistop," "Seet," "Marvelseal")	Covering of textile artifacts
Wooden coat hangers, wishbone, and crescent types. Extra-long hooks	Costume display in store
Acid-free tissue paper ream	Required for packing and transport

8.6.4 Packing and Unpacking

The requirements for packing for long-term storage will be different from packing for moving and protecting an object. Packing material must be absorbent and able to withstand harsh environmental conditions of high relative humidity (RH) and temperature fluctuations during transportation and storage [25]. Packing and unpacking may be done by two different individuals at different places; therefore, instructional labels should be put on the packing for ease of unpacking. Textile objects should be unwrapped carefully as per the instructions to avoid any damage to the objects.



Figure 8.2 Handling and storage of 15 to 17 CE ancient textiles at Temple Newsammuseum, Leeds (a) Handling of textile using latex hand gloves (b, c) Storage and display of textiles covered in transparent nylon film to prevent atmospheric dust [24].

- Line the box with sheets of tissue paper (Figure 8.3).
- Allow space for cushioning. Never overfill a container.
- Arrange fragile and light items on top and heavier at the bottom of the packing boxes.
- Arrange the item using cushions, tissue paper, and snowballs.
- Labeling of the list of items in the box is always helpful during unpacking.
- Wrap each object separately using a tissue paper sheet.
- Use the tissue to lift the object into the box. Use tissue liner over the objects.



Figure 8.3 (a) Handling and packing of 15 to 17 CE ancient textile tapestry bag at Temple Newsam Museum, Leeds. The bag was wrapped in conservation quality tissue paper and stored in the same size cushioned box. (b) An 18th CE bridal silken brocade lehenga having all over moon motifs from India (private collection). The lehenga was basked and stored in wrapping paper after every use and largely untouched with water and any dry wash solvents. The wrapped lehenga was stored in a box with moth repellents dispersed to keep away the insects [24].

8.6.5 Moving

Museum items are occasionally moved for the reasons, such as display, photography, and research for its relocation. The following precautions should be taken while moving the objects: the textile should face down to avoid exposure; the material is rolled and placed inside the tube of interleaving material. The rolled textile items fully covered and secured with extra sheets and tape need to be placed in containers fitted with lids during their movement. For the ease of unpacking, a label indicating the dimensions of textile artifacts is a useful guide for its handlers.

8.6.6 Rolling and Unrolling

Many textiles are stored rolled. Conservation quality rolling materials that do not stick to the fabric surface must be used. Rolling instructions for museum textiles are similar to the packing of museum textiles as written in the earlier subheadings. Unrolling must be done on a large clean platform where the whole surface of the textile can be spread. As the unrolling progresses, the interleaving material on the surface is removed and rolled simultaneously for replacement or reuse.

8.7 Labeling

Methods of labeling of museum textiles differ from museum to museum and objects to objects, but all of these methods generally consist of writing or typing the accession number on a fabric substrate, allowing the ink to dry if appropriate, and then stitching or binding the label to a stable and easily accessible textile area. “Substrate” is not a technical term used in the industry, but will be used here to refer to the fabric component of the accession mark, whether it is a tape or a nonwoven fabric [26]. As there is no standardized labeling standard, several different substrates and inks are used. Collections trust recommends that labels have the following characteristics [27]:

Secure—The possibilities of the label or mark being accidentally removed from the item must be relatively lesser.

Reversible—The label or mark can be removed from the item consciously, with as little trace as possible even after 50 to 100 years.

Secure for the object—However, neither the materials used on the object nor the process used to apply them is potentially harmful to the artifact.

Discreet, but visible—The recommended approaches do not detract from the item’s appearance or dark information. Nonetheless, the number should be noticeable enough to reduce the item’s handling.

Convenient and safe for staff and voluntary—Resources should be available readily and easily at fair prices, in limited amounts, and if used in conformity with local risk assessment team recommendations, should not pose major health risks.

8.8 Cleaning

Cleaning aged textiles is a constant area of research and development. Cleaning is a method that is irreversible and falls within a curative preservation category. The appearance of textiles is generally affected by the surface dirt and soil. Scientific studies have also demonstrated that dirt on the fabric accelerates the degradation of acidity and can mobilize damage to the fibers. In such situations, the decision on cleaning is complicated and taken after consultations with all stakeholders. The cleaning of historical textiles often involves a sort of consensus; between documentation preservation and improved conservation of textiles over a longer period of time; and between the effective removal of soil and the harm caused by the cleaning process [28].

Surface washing, as the name implies, includes removing dirt, dust, rust, and other foreign substances from the face of the garment. For this reason, only specific materials are used and a wide variety of tools are used, including brushes, erasers, tapes, etc. The choice of the tool depends on the quality of the cloth and the surface to be cleaned. Often surface cleaning serves as a preliminary step before any further cleaning operation is carried out. Also, several times, the conservator can only do surface cleaning for the artifact, depending on the situation and the desired result [29].

Wet cleaning requires the use of water as a method of cleaning textiles. Water has many advantages that make it the best medium for cleaning historic textiles. Textile preservatives add different additives to the water that help to enhance the cleaning of the textile. These may be surface-active agents, sequestering agents, dirt-carrying agents, and even some enzymes [30]. The type and quantity of these agents applied to the washing solution again depends on the type and condition of the textile to be washed and also on the type of dirt that is present on it.

Solvent cleaning refers to the process of cleaning with organic solvents that are used to extract soiling from historic textiles. This method of cleaning is commercially referred to as dry cleaning. Various organic solvents help to dissolve or swell the dirt, making it easier to strip it from the textile. Solvent cleaning is effective because only inorganic solvents are soluble in the soiling present on the artifact. Using this process, soils that are fatty, greasy, or oily in nature can be effectively extracted. Solvent cleaning is often advised where there is a chance of color bleeding or color change due to wet cleaning. If wet cleaning is likely to result in further degradation of the textile, such a process is used. For objects made up of velvet or embossed surfaces, solvent cleaning is desired as water may be detrimental to such structures. If the artifact is a composite piece containing various types of materials that can react differently to water, solvent cleaning is an alternative [31, 32]. However, care should be taken on the selection of the solvent so that the selected solvent should not cause dye degradation for color fading.

8.9 Dealing with Separations

In order to safeguard the artifact, those involved with costumes and textile collections often have to deal with the complete or partial division of the part of the object [33]. The most commonly divided or loose components that cause thread and fabric harm are fastenings

and trimmings such as hooks, buttons, leathers, waistbands, beads, lace, and fringes. In these cases, the separation is typical, but sometimes the weak thread is not used to attach it or build it. The second kind of separation consists of clothing, sections, or trims that occur due to the thinness of the textile. A distinction between the two needs to be resolved [34]. When thread damage has led to estrangement, the extent to which it is associated with a local problem or a symptom of widespread weakness is important to be determined. Every item with a widely used textile damage or weakness of thread must be referred to and stored by the conservator for evaluation [35].

8.10 Tools Used for Displaying Museum Textiles

Preserving on-display clothing and textiles necessitates striking a balance between supplying and conserving them. It is also a good idea to seek advice from a textile curator before making decisions concerning textile displays or costumes [36]. The specimen's condition influences its display acceptability and illustrates what is required to keep it in good condition during the exhibition. It is critical to perform a condition evaluation on each object in order to identify its requirements for any scheduled presentation. It is critical to establish the length of the show at the planning stage in order to reach a suitable standard of supporting materials and environmental factors [2].

8.10.1 Showcases and Galleries

The amount of support provided by the textile can differ based on its condition and various other factors. The affected cloth to be vertically placed must be handled with a textile preservative prior to exhibition. Display components should be of a standard of restoration.

The following solutions are available for items in poor condition [8]:

- Laying the fabric flat on a surface, horizontally or at an angle of no more than ten degrees;
- Handling and assembling the object by a textile curator.

For fabrics in secure and satisfactory condition, the conventional procedures can be used [35]:

- Vertical hanging by constant fixation, which evenly distributes the weight.
- Stitching the cloth into a plate that is evenly tensioned and coated with a preservation efficiency. Textiles greater than one square meter may be received from the textile curator if additional sewing is required.
- Drape the cloth over a cushion stand covered with a consistent fabric, such that the majority of the weight is supported by a container stand or the floor.

8.10.2 Frames

Frames serve as mini-cases for objects, protecting them from the environment, physical harm, and theft (Figures 8.4 and 8.5). The materials utilized in construction, particularly

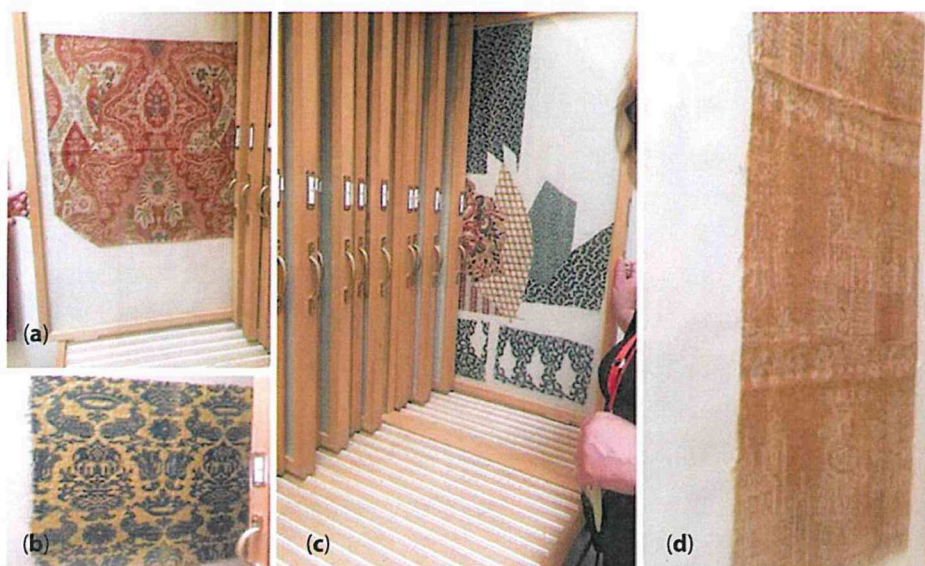


Figure 8.4 Ancient textiles display techniques in Temple Newsam museum (Leeds UK) (a–c) Textiles display on moveable compaction shelves (d) Wall mounting of textile [24].



Figure 8.5 Frame [41].

the inside, must be of conservation quality. They should be securely fastened away to keep dust and insects out [2]. Textiles in their original frames should be directed to the textile curator for condition assessment prior to use in exhibitions. Sewing is used to attach textiles to cloth-covered plates. Only tiny durable fabrics in a stable state should be installed for framing without first consulting the textile curator [35].

8.10.3 Mannequins

It is great to observe costumes on mannequins, which fosters a close relationship between humans and clothes, regardless of their universal social culture or special elements of design



Figure 8.6. Mannequins [42].

and wear history. It is critical to meet both aesthetic and conservation standards while purchasing mannequins. There are numerous options accessible [37]. Mannequins are specially designed for historical clothing and exist in a variety of shapes and sizes (Figure 8.6). The mannequins' originality is determined by the exhibition's design. Those with authentic looks and poses are essential to represent individuals in real-life settings, yet they look out of place in historical dress exhibitions [38, 39]. Mannequins built for an ancient costume with toned-down qualities, on the other hand, are not ideal for space. These play a significant part in advertising firms. They must appropriately fit the apparel, ensuring that the mannequin's shape, size, and location do not alter [40].

8.10.4 Hangers

Extremely delicate parts cannot be fitted to mannequins because they must be completely protected from a shape intended to match the cloth interior. These mountings constitute a



Figure 8.7 Hanger [44].



Figure 8.8 Vertical mounting display [41].

distinct task, and the textile curator should be assigned to them (Figures 8.7 and 8.8) [43]. Pins should never be used for costumes since they corrode and discolor [35]. Covering a hanger with cotton batting or acid-free tissue paper and wrapping or laying washed undyed muslin over the cushioning is also recommended. Other issues, such as open boxes for acid leaching, scattering on fabrics and yarn, and spoiling costumes, can be avoided by padding and covering wooden hangers [8].

8.11 Handling During Transportation

The various kinds of transportation used in transit displays will now be discussed. The museum must strike a balance between cost and conservation. The transportation networks covered in this article are those currently used by museums and galleries, depending on the circumstances, by bus, railway, sea, air, and different variations. This is to identify the physical characteristics of movement that affect conservation and condition, rather than to remain entirely in basic documentation, insurance, and cost concerns to registrars and transportation authorities.

8.11.1 By Road

In cities, smaller packages are provided in passenger cars for rapid transport. The wrapping is typical of parchment, plastic corrugated, and polystyrene foam, which implies that there is no adhesive or sticky substance close to the object's surface. Even if the air temperature is too high, there will be no substantial change within the kit for 1 or 2 hours in the microclimate [45]. Car accidents can happen, and the damage can be from a crash or a burn. Many museums, however, ship objects via commercial vehicle for a shorter journey. Each museum has its special vehicles designed for the transport and control of art artifacts with the least amount of load [46]. The exclusive use of a commercial vehicle is only

cost-effective if the product is substantial and improved handling is required. In tropical or subtropical climates, vehicles should preferably have cooling mechanisms or be stored in cool environments at least initially until loading [47].

8.11.2 By Rail

Typically, two types of rail transit exist: freight and express transportation. Because the slower methodology is primarily intended for major companies and consumer products, museums rarely adopt it. Typically, freight is the transportation through train from city to city [48]. Items of art that will be transported by freight should be packaged in high-strength, shockproof containers that can withstand large temperature variations and delayed delivery. In extreme cases, express shipments may be supervised directly in the baggage car by a courier, as well as by the management and deployment of such individuals [47]. In exceptional cases, express shipments can be controlled directly by couriers in the luggage wagon.

8.11.3 By Sea

The ship's storage is typically housed in a strong room or in a higher location to protect it from climatic change (i.e. during storms). In such instances, the coating and packaging materials should be designed to prevent the products from shifting or settling and causing damage to them [49]. Vapor barriers are typically necessary for double-box packaging. The customs inspection must be prepared in advance, not in the ports or sheds of the shipping corporations, but the destination museum [50]. Monitoring the handling, storage, and environmental requirements is recommended for case safety. High humidity and salt air infiltration from poorly constructed cases can affect the content [51].

8.11.4 By Air

The most efficient, productive, and faster means of transportation is air travel. According to statistics, the number of injuries per kilometer traveled makes this the safest. Typically, two modes of air transportation are available: air express and air freight [3]. If a nonairtight case is installed on an airplane and the ambient (cabin) pressure drops significantly during flight, air may leak from the inside of the case, depending on the activities of the gases at reduced pressure [52]. The aircraft bags can reach temperatures as low as 4°C during a long voyage at high altitudes [46]. On landing, the cooled cases are removed under normal conditions, and the moisture content will be higher in warm air, and condensation will cause harm. Because air travel is a mode of transportation, the pressure, temperature management, and atmospheric conditions at the landing site must be determined [47]. Airfreight costs are decreased by using lightweight materials and packaging as little as feasible. If a case fails or is deficient in heat isolation, dunnage, shock absorption, and air drainage, the contents are not adequately protected [46, 53].

8.12 Handling Techniques and Conservation Practices of Ancient Textiles in Museums

The earliest methods of textile conservation at Victoria and Albert Museum are sewing threads and adhesive. Professor Sheila Landi first reported about polyvinyl acetate and polyvinyl caprate emulsion as a thermoplastic resin to be applied as backing on supporting nylon tulle. The prepared backing was then attached to ancient textile material by applying warm iron from the backside [54]. Later, natural fabric material and dyes were more commonly used as conservation material in the textile museums.

Few case studies regarding ancient textile conservation techniques adopted in museums are as follows:

8.12.1 Egyptian Shroud

The shroud from one of the excavated mummies was humidified in a humidification chamber to soften the material prior to its cleaning. A softened shroud was kept between two polyester crepe sheets prior to washing in a suction table using ethanol and water. The process cleaned the shroud showing its full details. Silkscreen was used as conservation fabric backing for shroud restoration and display in the museum. Shroud was kept horizontally on a padded nonwoven Teflon coated polyester sheet, facing downward. Silkscreen treated with 10% Lascaux 498 and Mowilith was stretched and placed at the backside of the shroud. A perforated Teflon-coated soft padding impregnated with acetone, a polyethylene covering, and a weight of a wooden board of similar size was pressed over the silkscreen. After 10 minutes, the wooden board and Teflon coated paddings were removed and shroud with silk backing attached to it was left to dry for half an hour. A restored shroud was displayed in a museum, covered in a clear Perspex sheet to prevent any degradation from ultra-violet rays [2].

8.12.2 Jordanian Belt

An ancient historic woollen belt in a Jordanian museum was secured between two layers of stretched nylon mesh using silk sewing thread restoration purpose. Belt was wet cleaned by using neutral soap and gently immersing/pressing in the wash tank. Washed and rinsed belt, free of dirt particles was flat dried with occasional drabbing with a dry cloth. The method of restoring the belt using aqueous emersion was inexpensive. The restored belt was stitched over a framed linen material for preventing damage during further handling and display [2].

8.12.3 Silk Textile

Silk fabric dating the Ottoman period was restored by dyeing the missing design parts of the fabric in natural dye in an Egyptian museum. The restored fabric was supported by new linen fabric stretched on a metal frame for display in exhibitions [33].

8.12.4 Coptic Tapestry

A Coptic textile called “*Kabati*” woven in tapestry style was restored in an Egyptian museum by mounting the tapestry over matching blue linen material. Unravelling of the tapestry was engineered using woollen yarns interlacement in tapestry to make it look finished at the edges. The undyed silk sewing thread was used to attach the tapestry over matching linen using blanket stitches at the edges of woven designs. Frayed yarns and spaces of tapestry designs were filled with matching threads and couching stitch [50].

8.13 Conclusions

The useful life of collected artifacts and its accessibility of information are directly influenced by storage and handling methods. Overcrowding, careless, or haphazard storage conditions can all cause damage to archives. Chemically unstable and ill-fitting shelving and storage enclosures hasten the decomposition of the materials they are supposed to protect. Normal use causes wear, but inexperienced or rough handling can cause extensive damage to collections, necessitating expensive repair or replacement. By following the guidelines outlined by the museum authority, the longevity of collections can be significantly increased. Maintenance of museum textiles calls for dust free display conditions with suitable lighting and proper storage. Routine task of collection care must be ensured in a textile museum for maintaining its original brightness. A separate area for display preparation and incoming artifacts inventory formalities must be marked in textile museums. Secure packing, safe transportation, and sterilized display of artifacts play an important role in preserving the pieces of inheritance till eternity. Rules for visitor's interaction with textile artifacts and stored collection will ensure the longevity of ancient textiles and preserve them for the generations to come in a better way.

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