Article: No object is frozen in time: Revisiting traditional and nontraditional leather treatments as a collaborative effort

Author(s): Alexandra Allardt O’Donnell

Source: Objects Specialty Group Postprints, Volume Five, 1997
Pages: 142-151

Compilers: Virginia Greene and Ingrid Neuman
www.conservation-us.org

Under a licensing agreement, individual authors retain copyright to their work and extend publications rights to the American Institute for Conservation.

Objects Specialty Group Postprints is published annually by the Objects Specialty Group (OSG) of the American Institute for Conservation of Historic & Artistic Works (AIC). A membership benefit of the Objects Specialty Group, Objects Specialty Group Postprints is mainly comprised of papers presented at OSG sessions at AIC Annual Meetings and is intended to inform and educate conservation-related disciplines.

Papers presented in Objects Specialty Group Postprints, Volume Five, 1997 have been edited for clarity and content but have not undergone a formal process of peer review. This publication is primarily intended for the members of the Objects Specialty Group of the American Institute for Conservation of Historic & Artistic Works. Responsibility for the methods and materials described herein rests solely with the authors, whose articles should not be considered official statements of the OSG or the AIC. The OSG is an approved division of the AIC but does not necessarily represent the AIC policy or opinions.
NO OBJECT IS FROZEN IN TIME: REVISITING TRADITIONAL AND NONTRADITIONAL LEATHER TREATMENTS AS A COLLABORATIVE EFFORT

Alexandra Allardt O'Donnell

Abstract

Examination and treatment of leather artifacts is the subject of debate when the wide degree of variability in the nature of animal skins is overlaid with how the leather has been prepared and its subsequent defined function or method of appreciation as an object. As this durable material ages and is exposed to use and display, maintenance and repair become part of its history adding another level of intricacy. With time a web is spun that often adds numerous layers of materials and techniques (known and unknown) to the current interpretation of how and when to treat the material in its present state.

The past decade has brought greater understanding of how some of these factors work independently and react with one another. With the advance of analytical techniques, the effects of a number of traditional and non-traditional treatments can be more accurately understood. This presentation briefly presents a historical review of a range of treatments and concerns. It emphasizes the importance for detailed documentation and continuing assessment of prior treatments, as well as the need to foster collaborative forward looking efforts.

Introduction

Leather is a versatile material that has piqued man’s interest through the ages. As methods of skin preparation were expanded from simple scraping and chewing techniques to include means of oiling and stuffing the fibers, to further include a variety of more sophisticated chemical tanning processes, the use of animal hides spread widely though human cultures.

Animal hides are a versatile and important material in the development of cultures. In Europe the processing of hides into leather and the subsequent manufacture of objects from leather became important crafts by the time of the Middle Ages. With the advent of political stability, the formation of merchant and craft guilds fostered social and economic changes. In an effort to limit competition and protect their market, the craft guilds established strict admission requirements and stringent rules on prices, wages, standards of quality, and operating procedures. Like other craft guilds, the processing of leather and manufacture of leather items were dictated by guild procedures. Instruction and experience were handed down through an apprenticeship format. In the United States, this European apprenticeship training format in modified form continued up through the period of the Industrial Revolution. Even today one can still see a type of apprenticeship in small rural industries and living historic museum sites where shoemakers and saddle makers continue their crafts in the hand sewn traditions.
Historically paralleling European guild traditions are the leathercraft traditions of Native Americans. Although the end product of hide into leather is similar, the means to this end by Native Americans differ greatly. These skin preparation methods were passed through oral traditions and not established through a controlled set of procedures. Rather than the European vegetable and alum tanning methods, the tanning procedures of native Americans generally embraced a broad category of oil and smoke tanning techniques. Not confined by rigid procedures, methodology varies by tribal association and geography. The leathercraft techniques and materials differ so widely from a European perspective that they can for convenience be called “non-traditional.”

Whether the methodology focused on traditional or non-traditional techniques, an understanding of tanning in its many different forms could make this material strong or weak, flexible, rigid or moldable, water resistant, and wonderfully durable. Human resourcefulness readily incorporated these physical characteristics into improving man's existence. Regardless of where in the world they originated, the range of leathers and their functions are vast.

As with all items made for enjoyment or consumption, with time leather objects became worn, damaged or in need of restyling. When justified, damaged pieces were simply replaced. When total replacements were not required and methods of repair more appropriate, patching was achieved with skived leather, or in more recent times cloth. Means of attachment varied widely. Commonly observed are hand stitching or gluing with a hide-type adhesive or a resinous bitumen-like adhesive that hardened and smoothed the reverse flesh side. These methods allowed for making strong repairs and worked with an understanding of the physical compatibility of these materials. Pragmatic approaches to repair and treatment of leather objects continue to work well for objects that are outside the restrictions imposed on the treatment of museum collections.

However, once incorporated into the museum environment a new set of questions is imposed on the treatment of these pieces. As the object is often no longer required to have a durable or applied function, the approach to treatment is viewed in a different light. Increasing the life expectancy of the leather, not durability, becomes the dominant focus. Among a long list of dictates both formally through our Code of Ethics and informally between ourselves, conservators query reversibility, longevity and stability of the treatment methods and materials. Practitioners also debate the appropriate means to impose minimal intervention as a treatment course of action. We concern ourselves with the historical and cultural integrity of the repairs and how we as interlopers can skew interpretation of the artist’s intent. These questions, among others, have caused in the past, and continue to cause, discussion, exchange and experimentation. I offer this selective review of leather treatments in an effort to prompt a retrospection and discussion among ourselves and to reinforce the need for detailed documentation, collaborative assessment and progressive thinking.
In reflecting on the examination and treatment of leather objects, revisiting a leather project I undertook twenty five years ago seemed appropriate. The treatment of the Ghent Treaty Box was a novel treatment at the time. Belonging to the American Institute of Architects, the small domed box has a long history of display at the Octagon House in Washington, D. C. I choose this as an example because it represents an approach to treatment reflective of the procedures, knowledge and ways of thinking of that fledgling period of our profession. The treatment involved the most contemporary of materials and resulted from a compilation and study of our then existing knowledge of the deterioration of vegetable tanned leather. It also is reflective of our fascination with synthetic resins and how we hoped their potential suggested the ultimate answers. Different approaches to strengthening weakened and brittle leathers were being devised. Consolidation with methacrylate resins and vinyl acetates and epoxies were sources of studies. The use of these materials in this treatment fostered discussion, experimentation and collaboration then as, I hope, it does now.

In 1973 initial examination notes on this small leather covered box detailed the condition of the leather surface as being extensively cupped and brittle. Most exposed edges were powdery. The leather was very fragile and dry. Extensive damage had been caused by beetles which had tunneled along the sizing layer between the leather and wood, leaving little to support an exterior grain layer but pockets of air or at best frass residues. Numerous areas of loss to the leather were also noted throughout the four sides and domed top. A number of surface pH tests indicated ranges in the 4.1 to 4.7 range.

Treatment involved brushed and injected applications of a diluted Pliantex, an ethyl vinyl acetate. The surface was repeatedly coated. Subsequently additional injections of a more viscous solution of Pliantex were forced under the surface skin to bulk up and support the thinned areas. As the treatment report relays, “In this manner the broken leather fibers were saturated and flexibly encased, the wood strengthened and filled and the vermin frass consolidated forming a base for immediate support for the leather and insuring against further infestation from the existing eggs and larvae” (O’Donnell, 1973). After a prolonged period of drying, the impregnated cupped leather surface was relaxed and set down using local application of heat “to return it to an optimum plane” (O’Donnell, 1973). The treatment at completion was visually smooth and intact. The issue of fills for areas of losses was discussed. “Out of respect for the original materials because of its historic importance, and in hope not to falsify or create an incorrect aesthetic appearance, only two areas of major loss were filled in the leather with a putty mixture of the resin and pigment. They were given a unifying tone but left detectable upon close examination but diminishing the disturbing contrasts” (O’Donnell, 1973). Notes from several telephone conversations show that the preference of the owner was to leave them void except for the two largest losses which were to be toned but not made invisible. A gloss was desired for the finish.

When the treatment was completed, the leather covered box was returned to its owner and placed
prominently on display on a table in the center of the room. During the next few years a number of my classmates and my professor, Sheldon Keck, offered when in Washington to make side trips to view the box and report back to me. With a sense of sadness they observed that in an unregulated environment which at times included direct sunlight from a series of bay windows, the leather surface returned to its pre treatment cupped condition within a few years.

In the past decade in conjunction with a long term project to renovate the museum house, the box was taken off display and placed in storage. It has not been available for examination. In speaking with the collection manager, Sherry Berg, the box has been placed on a high treatment priority list as they would like it returned to display as a focal interpretation element of the house. The issue of treatment need is centered on correcting the cupping of the leather surface. Other than the surface cupping no other markers of deterioration were noted by the collection manager. Interest was also expressed in compensating areas of loss that had been left uncompensated and reducing the high surface sheen.

Re reading the treatment file gave me an opportunity to rethink how I might approach this now and what might I learn from this exercise. While this particularly fragile and powdery leather surface at the time of initial examination seemed to call for a radical treatment approach, I will share that it never occurred to me not to treat this piece. Nor did I earnestly consider taking a minimally invasive treatment approach. The assumption after physical and microscopic examination was that the leather was too damaged from the ravages of "red rot" and was too dry, brittle, and insecure to merit a more traditional treatment of potassium lactate buffer and an oil based dressing. My focus, which I believe to be reflective of the profession at that time, leaned towards the aggressive treatment of symptoms of damage and insecurity, and the potential to formulate an acceptable solution that met the professional criteria of reversibility and object treatment sensitivity. Discussions with classmates, professors and more experienced colleagues, and exchanges with the Central Research Laboratory of Objects of Art and Science in Amsterdam led me to explore impregnations with a variety of resins, the samples of which I still retain along with my notes, correspondence, and treatment report. What I now appreciate more clearly is that no object can be frozen in time. With twenty five years behind us, the leather covered box will present an interesting discussion when it begins a second generation examination. This prior treatment has added a twist to the future treatment as now this object is not simply a leather covered box. It is leather that has been embedded in a synthetic resin.

A revisit to the treatment notes, display observations and the past twenty years history of the object also underscores the need for the environment into which it would be returned to have its own set of limitations. Although correspondence shows that I inquired about display conditions, it was focused on whether the box would be opened or closed. The inquiries were concerned with the aesthetics and physical security of the piece on display. The inclusion of recommendations for the storage and display environment would have further insured the stability of the treatment and the object. This holistic approach to treatment was not more thoroughly embraced until the 80's. The current condition of this particular project is partially the result of those missing elements.
Since my initial plunge into leather conservation, we have learned more about the properties of leather and the effects of ambient conditions on the different tanning solutions. Conservators have gained a better understanding of the material and the processes of deterioration. A generation ago, we were basing our judgements on touch, feel, and visual interpretations of condition. We used our tactile experience and the intuition gained from working with leather as a material. In reality we did not have a clear quantitative or qualitative evaluation of how far the red rot had progressed, what the dressing needs were, or how moisture deprived the leather was. We worked blindly from an analytical standpoint. Over the years, as conservators built upon insights and support from our conservation scientists, we also realized that the more we know, the less we knew in relation to the whole. As more questions were formulated, more questions needed to be answered. Publication and advances in research at the Leather Conservation Centre in England and the Instituut Collectie Nederland in Amsterdam have spearheaded much needed research and fostered cooperative efforts around the world. As part of this evolution we continue to need to debate, analyze and explore additional plausible methods and examine our past treatments for their success and markers of deterioration.

Dressings Review

It is simple to reiterate how hindsight is always 20/20, but it is interesting to look back to see from where we have come and how it has helped us where we are now. Prior treatments on museum objects have led to a better understanding of the dressings and how they affect the leather themselves. A brief survey of leather dressings may yield another perspective to consider. My own treatment of the Treaty Box precluded a dressing on the unqualified assumption that the leather was beyond a level of deterioration that a dressing would help. Now I would more accurately characterize the condition of the leather.

The need to “feed” and clean leather is a maintenance task that has persisted without necessarily a clearly identified purpose until recently. It comes perhaps from the traditional maintenance procedures of heavily used equestrian leather such as bridles and saddles, where the need to remove sweat, dirt, and body oils is important in order to maintain the physical flexibility (slippage of leather fibers over each other) and durability (removal of embedded particulates) of these objects as well as adding a protective surface layer against physical abrasion over the exterior grain layer.

This traditional maintenance process has been translated into the need to maintain many leather objects with dressings. Numerous dressing recipes are published in literature. Commonly, combinations of lanolin, neatsfoot oil, fish oils, and waxes were utilized in the past century on vegetable tanned leathers. During the past generation we broadened our palette of materials. Synthetic waxes and oils, including different weight water soluble waxes and synthetic oils were the sources for experimentation especially on native tanned leathers. I surmise that applicators like myself were seduced by the short term humectant quality of the synthetic coatings. Information
about potential cross-linking factors did not come to light for another decade after these treatments.

Once a dressing was selected, the question of how much dressing to apply remained a variable. How much a leather piece could or should absorb was a gray area. With time we could observe the effects of overdressing as surfaces remained tacky or sometimes the leather itself appeared to become weaker rather than stronger. In some cases, a disfiguring white surface bloom resulted from overdressing. Without analysis these fatty acid deposits were sometimes mistaken for mold rather than the markers of deterioration they are.

Besides the disfiguring visual affects of a hazy bloom accumulating on a surface, the long term contact with excess oil can affect the physical stability of the leather itself as well as any decorative paint layers that might have been added over the leather substrate. Exposure to oxidizing acidic oils slowly softens paint layers making them more easily affected by future mechanical and solvent action undertaken by caretakers. The excess applications also create a barrier layer on the surface as they oxidize. Oxidation causes a hardening of surface accumulations causing them to further inhibit future dressing applications from penetrating through to the backside. The failure of the dressing to penetrate in effect starves the leather from the secondary humectant benefit of some oils. As a consequence the leather appears physically dry and feels brittle.

To further complicate the potential diagnosis, these symptoms of dryness and embrittlement are conditions that can also describe a chemical deterioration of the fibers themselves, in what is more commonly known as red rot. We are now aware that visual and tactile examinations need further supporting information in order to more accurately determine the cause of this symptom. An accurately targeted diagnosis of the condition is especially important as each rationale suggests a different approach to treatment.

What we did not understand with clarity was the effect these oils might have on pH if left alone in a static setting. A clearer understanding of the pH and its chemical relationship to the hide is published information (Wouter, 1992; Calnan and Haines, 1991). The fatty acids that have saponified on the surface from residual oxidizing oils and soaps are markers of deterioration and poor environmental conditions. In addition to the acidic oxidation process there is the more potentially damaging effects of acid hydrolysis. The absorption of airborne acidic pollutants by vegetable tanned leather in a humid ambient environment can set into motion the chemical deterioration processes of acidic hydrolysis when no buffering agent is present to mitigate the pH changes. A prolonged exposure causes a slow irreversible breakdown to the leather fibers themselves. These processes are hastened with temperature increases and when the leather is moisture deprived (Whitmore and Farrel, 1987).

In my own experience in the past 15 years with European gilded and painted leather wall hangings, the recommended dressing proportions continue to be refined. Conservators havegained
over the years an appreciation of analytical documentation to reveal more objective information on the state of deterioration. Analysis is undertaken to document the extractable fat content which allows for a calculated application of a specific amount of dressing at a specific percentage to bring the fat up to a desired content. Ten years ago I aimed for a 5% total content. Currently, 3% total content is my desirable goal so as not to soften the paint layers or to hasten acidic oxidation but to provide enough lubricant and humectant to the leather to allow it to become more flexible, pliable and resistant to physical stresses. As the information we gain from technical analysis becomes more refined, our reasoned course for proposed treatment will also continue to change.

Within this century, buffers in the dressings were suggested as a protection against the leather deterioration known generically as red rot by providing a buffer against an increasingly acidic environment. For decades the use of potassium lactate was advocated. More recent analytical evaluations demonstrated that the organic buffer imidizole has improved residual buffering results. We also now know that extensive chemical deterioration resulting in the quantitative presence of free mineral acids can lower the pH to such an extent the use of ammonia vapor may first be needed to neutralize the leather before a buffer can be applied.

Today, there are better means to evaluate the deterioration symptoms and identify the cause. If I had known this a generation ago, I may not have felt the need to consolidate the Ghent Treaty Box leather so aggressively or to dismiss the benefits of a buffer and dressing application.

Current Collaborative Efforts

As has been illustrated, conservators have grappled for over a generation with how to approach treatment of leather in a museum environment. Approaches have changed as an understanding of the material and the associated deterioration factors evolved. As a final example, I would like to highlight an upcoming project at the Isabella Stewart Gardner Museum in Boston that I believe is a notable current example of the theme of the talk—the need for clear documentation of past observations and treatments, and re-assessment of those records with collaborative efforts and forward thinking.

The Gardner’s project focuses on the leather wall coverings in the Veronese Room, a room appointed with European decorative arts which is on permanent display. This project has been funded in part by the Institute of Museum and Library Services and a private donor. The four walls of this 37’9”(L) x 22’3”(W) x 16’(H) room are covered with panels of embossed painted and gilded leather, a traditional European decorative wall technique. These 17th and 18th C wall panels and altar frontals are from the Netherlands, Italy, France and Spain, according to Dutch art historian Eloy Koldeweij. They offer an opportunity to revisit a well documented series of examinations and treatments starting in the late 1950’s. The leather project under the auspices of Barbara Mangum and Valentine Talland at the Gardner Museum conservation laboratory will
culminate in an extensive collaborative research and treatment project in the coming few years.

The panels were purchased for the Museum between 1897 and 1899. The Gardner Museum opened in 1903 and the Veronese room was part of the original installation. Photographs document that the gilded leather panels have remained in their current position since at least 1926, the year in which archival photographs were taken of each gallery in the Museum. Numerous photographs taken in subsequent years document the placement and begin to render a sense of collection history. Augmenting the photographic records, conservation notes from 1957 begin a carefully detailed written observation of condition and treatment history that continues through to the present day. These records provide invaluable information for the current focused assessment and treatment collaborative efforts. As an example, initial notes indicate the panels warping and the weak and brittle condition of the leather. Trial treatments were initiated to clean and stabilize the painted surfaces and the weakened leather supports. Over the following years a series of panels were treated in various well documented processes. A number were cleaned with a variety of combinations of saddlesoap, green soap, and castille soap and water. To reduce the stiffness and distortion some leather panels were dressed with neatsfoot oil, castor oil or Lexol, a commercially formulated leather dressing. As part of investigations into lining methods, procedures for a few panels utilized different formulations of wax-resin and PVA emulsions combining a variety of backing materials and heat. By 1966 it was noted in a “review of the leather situation...do not use any adhesive requiring heat. Changes in RH drastically change the leather’s response. The waxes are not satisfactory” (ISGM Conservation Files). Detailed lab notes in the late 60’s document continuing use of saddlesoap, water, neatsfoot oil, PVA emulsion, PEG 1500 and hard waxes for surface finishes. Notes today continue to indicate distortions in the leather panels and their stiff, and brittle conditions (ISGM Conservation Files).

With the advance of analytical techniques for the markers of deterioration of leather, this project provides a timely opportunity to revisit these panels to see how prior treatments may have affected the panels both chemically and physically and to devise an approach to retreatment that addresses the identified concerns. All the panels with known treatments plus all the remaining panels in the room are planned as a large examination, documentation and treatment project over the coming several years. The initial steps in examination and documentation of condition have begun. I have a role as Project Consultant.

In the Fall of 1996, eighteen samples representing the different kinds of decorative and historical panel groupings were taken and sent for pre-treatment documentation and analysis at the Instituut Collectie Nederland in Amsterdam. The analytical investigations undertaken by Pieter Hallebeek have at this point focused on the determination of the extractable fat content, the pH and differential numbers, the shrinkage temperatures, the total sulphate and metals content, and the soluble sulphate contents and soluble nitrogen content such as ammonia (Hallebeek, 1996). By piecing together the information gleaned from these analyses, this collaborative effort hopes to yield a better understanding of the degree of degradation and its causes and its effects. This in turn allows for a reasoned course of proposed treatment.
Pieter Hallebeek's analytical information indicates that, "The leather as a whole is reasonably sound but in vulnerable and unbalanced state and before the leather is treated, any kind of physical movement can cause much damage. The leather fibers are visually still in reasonable condition and not broken but very brittle and they break easily because of the lack of moisture and fat" (Hallebeek, 1996). The panels are fragile. Fortunately, however, the degree of chemical deterioration and presence of red rot is relatively moderate and probably does not indicate the need for total impregnation with an irreversible consolidant. The degree of dryness is extreme and appears to be a leading cause of the frailty of the panels. The analysis also indicates that there may be a connection between the state of deterioration and the presence of wax on the surface. The preliminary conclusion is that the absorption and release of moisture by the leather is altered by the non-porous wax coating.

The project collaborators will continue further in the investigation and examination of the condition of the panels in the coming year. This will also involve developing approaches to reduce the excess amounts of waxes, oils and lining products in the leather in order to prepare it for potential neutralization, buffering, and dressing in an appropriately controlled and quantitative method. Backing and remounting systems will also be investigated and chosen. Additional analysis is planned to document changes that occur through treatment.

In summary, with this review I have no definitive answers for treatment of leather. I do know it is a more complex material than was initially assumed. I have learned by my successes and mistakes and by sharing discussions and investigations with others. I have learned by asking questions and obtaining the support of conservation scientists. I have learned by sharing resources among colleagues and with other related industries. I have learned by looking back and realizing that collaborative efforts have brought us forward; that sometimes answers are not as simple as they appeared before; and that we sometimes have complicated the issues with our solutions of the past few decades.

Acknowledgments

I would like to thank my colleagues and classmates Chris Tahk, Dan Kushel, and Miriam Peck Dirda, and my colleague at the Octagon House, Sherry Berg, for their willingness to search files, duplicate slides and provide long distance legwork and dialogue in support of the revisit to the Ghent Treaty Box project. I would also like to acknowledge the extensive analytical support and shared experiences over the past two decades provided by my colleagues in the Instituut Collectie Nederland, Netherlands Institute of Cultural Heritage, especially Pieter Hallebeek, during our quests for analysis, methods of repair and treatment of gilded and painted leather. I wish also to thank the conservators at the Isabella Stewart Gardner Museum for their thoughtful support in involving me in their upcoming project by sharing their records, photo documentation and collaborative processes.