

Thermo Lignum

From Art to Architecture.

The Thermo Lignum® WARMAIR Treatment as an integral Part of Conservation and Restoration



The Thermo Lignum® Treatment

We at Thermo Lignum® are no conventional pest controllers. From the very beginnings we have considered the Thermo Lignum® service as an integral part of modern day conservation, restoration and insect pest management. Our technology has been continuously developed and refined over a period of more than twenty years.

First Class References across Europe

Our prestigious list of clients includes the Victoria & Albert Museum, the National Gallery, the Natural History Museum, Tate Britain, Tate Modern to mention only a few located in the UK. In Germany we have worked for the Reiss-Engelhorn Museum in Mannheim, the Bavarian Palace Department and the avant-garde documenta in the city of Kassel. Austrian clients, among many others, include the Salzburgmuseum, the Universalmuseum Joanneum Trautenfels, the Bundesmobiliendepot in Vienna and the Basilica Maria Taferl. In Switzerland the Historisches Museum in the city of Berne is operating a Thermo Lignum® system. The Nasjonalmuseet for kunst, arkitektur og design and the Kunsthistorik museum, both located in Oslo, rely on the Thermo Lignum® technology. In Rome we have treated the entire church inventory of the Collegio Santa Maria dell'Anima in one of our mobile units.

First Class Exhibits across Europe

Over a period of twenty years a large number of valuable artefacts made of wood, paper, textiles, leather, fur and feathers have been entrusted to us with objects ranging from artwork, musical instruments, oil on board and canvas paintings, gilded and polychrome sculptures and furniture, to rugs, tapestries, textiles and garments as well as natural history specimens.



Taxidermied crocodile, Apothekenmuseum Schloss Heidelberg



Woodworm damage in table frame

Our UK branch has treated oil on canvas paintings by Botticelli, Auguste Renoir and Thomas Gainsborough when woodworm invaded the stretcher frames. Nonetheless, art does not necessarily have to be centuries old to become infested. We have attended to contemporary art as well: Anselm Kiefer, Ashley Bickerton, Günther Förg, Tracy Emin, Gérard Quenum, Polly Morgan, Chris Ofili, Imi Knoebel and Oticica are just a few illustrious names from this artistic sphere.



Spanish Jerome, oil on canvas, Spain, 1628

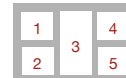


Sculpture, Saint Damian, southern Germany, 18th century, Deutsches Apothekenmuseum, Schloss Heidelberg

Scientific and conservational Studies across Europe

Our client's confidence in the Thermo Lignum® technology is both reflected and confirmed in numerous scientific publications and studies, some of which have been undertaken by internationally eminent authorities in the field of museum entomology and Integrated Pest Management (IPM): First and foremost, David Pinniger MBE who has been both shadowing and validating the Thermo Lignum® treatment, as well as Robert E. Child BSc, recently retired as head of Conservation, National Museums and Galleries of Wales. The leading German specialist on wood-boring insects, Dr.rer.nat. Uwe Noldt of the Johann Heinrich von Thünen Institut in Braunschweig, has been following Thermo Lignum® closely and has published a number of papers on our technique.

The Thermo Lignum® technology is time and again topic of lectures during international conventions, such as the "International IPM conference Vienna 2013", a conference held at the Kunsthistorische Museum, that was preceded by a two day workshop chaired by David Pinniger and Bob Child or the "Pest Odyssey 2011", an international symposium in London, hosted among others by the British Museum.



Photos Cover:

1. Sculpture, St. Mary, southern Germany, around 1450, Apothekenmuseum Schloss Heidelberg
2. Carved bryony roots, China, 19th Century, Apothekenmuseum Schloss Heidelberg
3. Secretary, southern Germany, around 1820, Boettcher Restoration
4. Leather bound books, Germany, 16th Century, Apothekenmuseum Schloss Heidelberg
5. Carpet "Lotto" Uschak, West Anatolia, Turkey, 17th Century, private Collection

The Technology

With the sensitive Thermo Lignum® Method we can offer tailored Solutions for all organic Materials and Conditions

In our Thermo Lignum® WARMAIR chambers we can treat furniture, paintings, polychrome and gilded sculpture, musical instruments, books, textiles, leather and other organic materials. The process is so sensitive that even marquetry or Boulle, lacquer, gold leaf or Japanwork show no post treatment changes.

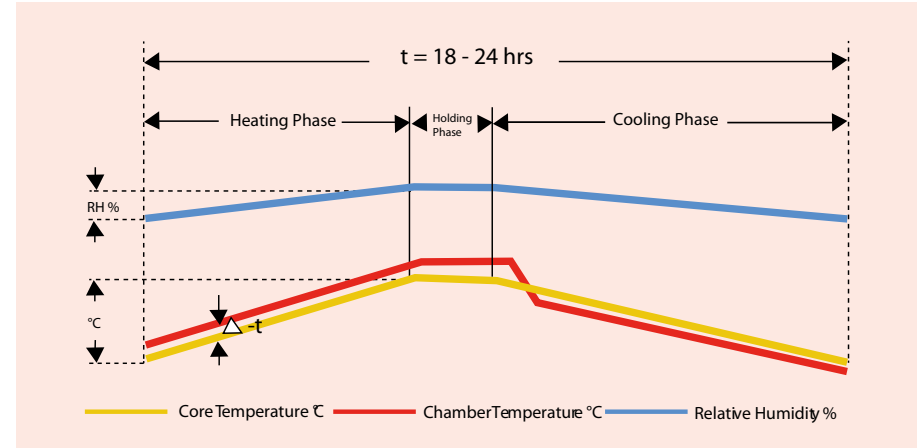
The Thermo Lignum® process essentially targets the susceptibility of insects to elevated temperatures (50-55°C dependent on species) based upon incontrovertible biological evidence together with the research and findings of distinguished entomologists. Once the core of the object has reached a certain predefined temperature over a predefined period of time, the insects are 100% dead.



Double-headed eagle, carved and gilded, Austria, 18th century, Apotheke museum Schloss Heidelberg



Secretary, around 1725, probably Bavaria, private collection



Schematic Process of a Thermo Lignum® WARMAIR treatment with controlled relative humidity in a sealed system (chamber or temporary housing of object)

A credible Concept from a Conservation Viewpoint

The principle behind Thermo Lignum® WARMAIR is to ensure the stability of moisture in objects by maintaining relative humidity (RH) within a narrow band (usually 50–55% but in certain cases and with some materials as dry as 40%) throughout a heating cycle from room temperature up to 49-55°C (the kill temperature) and back. Computer based monitoring and controlling of RH prevents damage to the object. We also predetermine and control the temperature difference between the object's surface and core; the narrower this gap, the more gentle the treatment.



Vivatband and Order Pour le Mérite, silver sequin, wool, silk, cardboard. Friedrich der Große Museum im Lerchen- nest, Sinsheim-Steinsfurt.

For all Things organic there is an Insect which has evolved to regard it as Food

That was the challenge behind the development of the Thermo Lignum® WARMAIR process. Using only naturally occurring elements, air and water, sound biological principles and established laws of physics, all insects inhabiting organic materials will die at any life-cycle stage when exposed to our heat treatment regime. The absence of any chemicals or noxious gases during the process allows immediate reuse of the items upon completion of the 24 hour-treatment, without risk of harm to your health, the object, or the environment.

Extensive Studies and Tests regarding Safety for the Object

In addition to extensive trials on a wide range of timbers, the method has been tested successfully on animal and synthetic adhesives, veneers, marquetry, metallic inlays, traditional and modern paints, gilt and polished furniture, lacquer and Japanwork, fur, feathers, leather and skins, ethnographic and natural history specimens, taxidermy, herbaria, paper and a wide spectrum of textiles. The safety of the WARMAIR treatment has been substantiated by a host of scientific studies.



Woodworm damage



Measurement reading of Thermo Lignum® building treatment

Thermo Lignum® Mobile

Flexibility for our Customers: The Thermo Lignum® mobile Units

The mobile version of the WARMAIR treatment system has evolved from the static chambers that have operated in Germany and Switzerland since the mid 1980's, and in London since 1994.

The owners or keepers of large collections of valuable works of art and antiques can now avail themselves of treatment without their property leaving the premises. This avoids unnecessary security risks, negates additional insurance cover and minimizes the handling and movement of objects. In addition the total absence of any noxious or odorous chemicals or gases allows immediate reuse or redisplay of the items.



Mobile treatment of a historical boat *The Cruiskeen*, Ireland



In-situ Treatment Probsteikirche St. Mariae Geburt, Kempen

Our in-situ Treatment for immovable Objects

Sometimes infested objects cannot or should not be moved; be it an altar, an organ, choir stalls, or any other large or heavy object in a fragile state. From a conservator's point of view any movement of sensitive objects should be avoided. The heavier or bulkier an object is, the more likely it is that it will suffer during transport. This is where Thermo Lignum® comes in with their in-situ treatment.

The objects are enclosed within a custom-made insulated framework, using a special foil, into which humidified WARMAIR is passed. Inside this "tent" numerous temperature and humidity sensors are positioned so as to enable monitoring and adjustment of the climatic conditions, just as in our static and mobile chambers.

Publications

Author	Title	Published in	Institute	Location	Publication date	ISBN
Ackery, P.; Pinniger, D.; Doyle, A.; Roux, K.	Heat Treatment of Entomological Drawers using the Thermo Lignum Heat Process	Collection Forum 2005 19(1-2):15-22	Department of Entomology, The Natural History Museum	London	2005	
Ackery, P.R.; Test, J.M.; Ready, P.M.; Doyle, A.M.; Pinniger, D.B.	Effects of High Temperature Pest Eradication on DNA in Entomological Collections	Studies in Conservation Volume 49, Number 1, 2004 p.35-40	The Journal of The International Institute for Conservation of Historic and Artistic Work		2004	
Anonym	Tests on Herbaria specimens and Paper enclosures	Study at the National Museums and Galleries of Wales	National Museums and Galleries of Wales	Cardiff	September 1995	
Anonym	Victoria and Albert Museum Conservation Evaluation on the Thermo Lignum Treatment for the Eradication of Silverfish	Study of the Victoria & Albert Museum	Victoria & Albert Museum	London	25. Juli 1996	
Beiner, G.G; Ogilvie, M.A.	Thermal methods of pest eradication; their effect on museum objects	The Conservator volume 29, 2005/6 p. 5-18	Pitt Rivers Museum, Oxford; Bristol Museum, Bristol		Juni 2005	
Child R.E.	The Thermo Lignum process for insect pest control	Paper Conservation News 72 [9]			1994	
Child R.E.	Treatment of Laccquered Material with the Thermo Lignum Process	Study of R.E. Child	Consultant on Environmental and Insect Pest Control on Historic Buildings and Collections	Cardiff	30. Mai 1995	
Doyle, A.M.	The Thermo Lignum Pest Control Treatment	NatSCA News Issue 11 p. 50-51	Natural History Museum, London	London	12. Juli 2007	
Ertelt, P.	Untersuchungen über kontrollierte Wärmebehandlung bei Befall von Schadinsekten	Diplomarbeit	Institut für Holzforschung Fachhochschule Rosenheim	Rosenheim	1993	
Kneppel, Beate	Schädlingsbekämpfung an textilen Kulturgut unter Einsatz hoher und tiefer Temperaturen - Untersuchungen zur Auswirkung auf Wolle und Seide	Kölner Beiträge zur Restaurierung und Konservierung von Kunst- und Kulturgut Band 2			1995	3-9804227-1-2
Nicholson, M; Rotberg,v W.	Controlled Environment Heat Treatment as a Save and Efficient Methode of Pest Control	Paper at the 2nd.International Conference on Insect Pests in the Urban Environment		Edinburgh	Juli 1996	
Noldt, U.; Niederfeiner, A.	Anwendung der stationären Thermokammer und Erfolgskontrolle	Michels,H; Noldt, U; Tagungreader Internationale Tagung Holzschädlinge im Fokus - Alternative Maßnahmen zur Erhaltung historischer Gebäude S 125-136	Westfälisches Freilichtmuseum Detmold	Detmold	Juni 2006	
Pinniger, D.	Acessments of the effects of Thermo Lignum Treatment on the varied carpet beetle Anthrenus verbasci	Study at the Central science Laboratory, London	Central science Laboratory	London	19. Mai 1995	
Pinniger, D.	Insect control with the Thermo Lignum Treatment	Conservation News Number 59 March 1996			März 1996	
Pinniger, D.	Saving our Treasures - Controlling Museum Insects with Temperature Extremes	Museum Artefacts - Pesticide Outlook - Feb. 1993 p. 10-11	The Royal Society of Chemistry 2003		Februar 2003	
Schachenhofer, B.	Optimierung des feuchtgeregelten Warmluftverfahrens - Anwendung im Westfälischen Freilichtmuseum Detmold	Michels,H; Noldt, U; Tagungreader Internationale Tagung Holzschädlinge im Fokus - Alternative Maßnahmen zur Erhaltung historischer Gebäude S 105-113	Westfälisches Freilichtmuseum Detmold	Detmold	Juni 2006	978-3-926160-42-3
Strang, T J K	The effect of thermal methods of pest control on museum collections	Proceedings 3rd International Conference Thailand			Januar 1995	
Strang, T J K	A review of published temperatures for the control of pest insects in museums	Collection Forum 8 [2]			1992	
Thomson, R.S., Chem, C.	The effect of Thermo Lignum Pest Eradication Treatment on Leather and other Skin Products	Study at the Leather Conservation Centre, Northhampton	The Leather Conservation Centre	Northhampton	April 1995	
WTA Merkblatt E 1-1-06 D	Heißluftverfahren zur Bekämpfung tierischer Holzzerstörer in Bauwerken				2006	
Tscherne, F.	Anwendbarkeit einer feuchtgeregelten Warmluftbehandlung mit dem Thermo Lignum Verfahren zur Schädlingsbekämpfung an historischen Kunstobjekten aus Holz mit Farb- oder Goldfassung	Feasibility Study	Holzforschung Austria	Wien	Juli 2008	

Excerpt from our Reference List

Thermo Lignum® Treatment of museum/church inventory and buildings

Client	Location	Treatment	Client	Location	Treatment	Client	Location	Treatment
UK			Germany			Switzerland		
Victoria & Albert Museum	London	Exhibits/Objects	Domkapitel Aachen - Aachener Dom	Aachen	Treatment of historical truss	Ufficio Cantonale di Musei Bellinzona	Tessin	Building treatment
Natural History Museum	London	Exhibits/Objects	LWL - Freilichtmuseum Detmold	Detmold	Building treatment	Bernisches Historisches Museum	Berne	Exhibits/Objects
The National Trust	London	Exhibits/Objects	Lippisches Landesmuseum Detmold	Detmold	Exhibits/Objects	Kunsthau Zürich	Zürich	Exhibits/Objects, modern art
Historic Royal Palaces	London	Exhibits/Objects	LVR Freilichtmuseum Kommern	Kommern	Building treatment, Exhibits/Objects	Aga Khan Museum	Genf	Exhibits/Objects
Sotheby's	London	Exhibits/Objects	Bayrische Schlösser- und Seenverwaltung	Bayreuth and Munich	Exhibits/Objects from both Schloss Bayreuth and Schloss Nymphenburg	Norway		
Christies	London	Exhibits/Objects	Deutsches Historisches Museum	Berlin	Exhibits/Objects	Nasjonalmuseet Oslo	Oslo	Exhibits/Objects
The National Portrait Gallery	London	Exhibits/Objects	Deutsches Apothekenmuseum - Schloss Heidelberg	Heidelberg	Exhibits/Objects	Kunsthistorisk Museum	Oslo	Exhibits/Objects
The Serpentine Gallery	London	Exhibits/Objects	Historisches Museum der Pfalz	Speyer	Exhibits/Objects	Østfoldmuseene	Sarpsborg	Exhibits/Objects
Hayward Gallery	London	Exhibits/Objects	Kulturstiftung Dessau Schloss Oranienbaum	Dessau	Building treatment	Austria		
The National Gallery	London	Exhibits/Objects	Heimatmuseum	Haselüne	Exhibits/Objects	Salzburgmuseum	Salzburg	Exhibits/Objects
Tate Modern	London	Exhibits/Objects	Erzdiözese Speyer Dom zu Speyer	Speyer	Exhibits/Objects	vorarlberg museum	Bregenz	Exhibits/Objects
Weald & Downland Open Air Museum	Chichester	Building treatment	Kunsthalle Mannheim	Mannheim	Exhibits/Objects	Beethovenhaus Wien	Vienna	Building treatment, ceiling
Dulwich Picture Gallery	London	Exhibits/Objects	Reiss-Engelhorn Museum	Mannheim	Exhibits/Objects	Landesmuseum Burgenland	Eisenstadt	Exhibits/Objects, depot
Imperial War Museum	London	Exhibits/Objects	Rheinisches Museumsamt - Pulheim	Pulheim	Exhibits/Objects	Salzburger Freilichtmuseum	Großgmain	Exhibits/Objects
Royal Airforce Museum	London	Exhibits/Objects	Prinz Ludwig von Baden Schloss Zwingenberg	Zwingenberg	Exhibits/Objects	Freilichtmuseum Stübing	Stübing	Building treatment, Exhibits/Objects
Tyne & Wear Museum	Newcastle	Exhibits/Objects	Ägyptologisches Institut	Heidelberg	Exhibits/Objects	Kunsthistorisches Museum Wien - Wagenburg	Vienna	Parquet flooring
The Royal Academy of Arts	London	Exhibits/Objects	Grassi Museum	Leipzig	Dry rot treatment	Wien Museum	Vienna	Exhibits/Objects
Guildhall Art Gallery	London	Exhibits/Objects	Bodemuseum	Berlin	Choir stalls, Exhibits/Objects	Bundesmobiliendepot Wien	Vienna	Exhibits/Objects
Royal Botanic Gardens Kew	London	Exhibits/Objects	Kath. Probsteigemeinde St. Mariae Geburt	Kempen	Dry rot treatment	Universalmuseum Joanneum - Schloss Trautenfels	Trautenfels	Exhibits/Objects
The Royal Academy of Arts	Richmond, North	Exhibits/Objects	Deutsches Theater	Berlin	Carriages	Basilika Maria Taferl	Maria Taferl	Dry rot and inventory
Kiplin Hall	Yorkshire	Exhibits/Objects	Kutschenmuseum Mannheim	Mannheim	Exhibits/Objects	Pfarrkirche Bad Mitterndorf	Bad Mitterndorf	Dry rot and inventory
Tate Britain	London	Exhibits/Objects	Documenta 11 & 12	Kassel	Exhibits/Objects	Pfarrkirche Friedersbach	Friedersbach	Altars, organ, inventory
The Royal Collection	London	Exhibits/Objects	Mühlenmuseum Lemgo	Lemgo	Building treatment	Kollegienkirche Salzburg BIG	Salzburg	Building treatment, dry rot
English Heritage	UK	Exhibits/Objects	Hamburger Bahnhof - Museum für Gegenwart	Berlin	Exhibits/Objects	Pfarrkirche Loiben	Unterloiben	Church inventory
West Dean College of Conservation	Chichester	Exhibits/Objects, leather	Belgium			Pfarrkirche Holzhausen - Diözesenbauamt	Depot Thalgau	Exhibits/Objects Church Holzhausen
The Leather Conservation Centre	Northampton	Exhibits/Objects	Design Museum	Gent	Exhibits/Objects	Erzdiözese Salzburg	Laimbach	Organ
White Cube	London	Exhibits/Objects	Museum M	Leuven	Exhibits/Objects	Pfarrkirche Laimbach	Sonntagberg	Organ
Manchester University Museum	Manchester	Exhibits/Objects	Sint Leonardus church	Brecht (Sint Lenaarts)	Furniture	Basilika Sonntagberg	Artstetten	Historic parquet, dry rot
Ireland			Italy			Schloss Artstetten	Niederleis -	Dry rot, Exhibits/Objects
Heritage Council	Mayglass	Building treatment	Embassy of Austria in the Holy See (Vatican City)	Rome	Entire inventory and doorframes	Schloss Niederleis NÖ	Niederösterreich	
Eamonn Cunningham/Fidelda Mullane, Architect	Project, Wexford	Building treatment	Collegio Santa Maria dell'Anima	Rome	Entire church inventory	Freischlössl, Salzburg	Salzburg	Building treatment, dry rot, Exhibits/Objects
John Sisk & Son, Limerick	Tonroe Cottage, Adrahan, Co. Galway	Exhibits/Objects	Portugal			Bundesdenkmalamt - Kartause Mauerbach	Mauerbach	Dry rot, tool collection
Conservation Letterfrack	Galway	Exhibits/Objects	Regional Government Terceira, Azores	Angra do Heroismo - Terceira - Azores	Building treatment	Kapuzinerkloster Salzburg	Salzburg	Exhibits/Objects
Private Client	Coolmore Stud, Tipperary	Exhibits/Objects				Stiftung Fürst Liechtenstein	Palais Liechtenstein -	Dry rot
South Tipperary County Museum	Tipperary	Exhibits/Objects				Pfarrkirche Schiltern	Vienna	Church inventory
						Pfarrkirche Bad Häring (Tirol)	Schiltern / NÖ	Church inventory
						Museumsdorf Niedersulz	Bad Häring	Church inventory
							Niedersulz	Painted cabinets 18 th and 19 th century, inventory

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