label: "9"

title: Demystifying Mist Lining

subtitle:

contributor:

- first\_name: Kate

last\_name: Seymour

title: Head of Education

affiliation: Stichting Restauratie Atelier Limburg (SRAL), Maastricht, The Netherlands

- first\_name: Joanna

last\_name: Strombek

title: Painting Conservator

affiliation: Stichting Restauratie Atelier Limburg (SRAL), Maastricht, The Netherlands

- first\_name: Jos

last\_name: van Och

title: Senior Painting Conservator (retired)

affiliation: Stichting Restauratie Atelier Limburg (SRAL), Maastricht, The Netherlands

keywords: mist lining, acrylic adhesive, minimally invasive, cold-lining, structural treatment, low-cost, nap-bond

abstract: Mist lining was developed by Jos van Och at the Stichting Restauratie Atelier Limburg (SRAL) in Maastricht, The Netherlands, in the 1990s. It has since been used successfully to line numerous paintings, large and small, of different ages, conditions, and painting techniques. Pretreatments are used to solve distinct problems, leaving the action of lining solely to providing additional support. The mist-lining system avoids the use of heat, moisture, and high pressure and thus respects the integrity of the original structure and texture. Mist lining provides an alternative, low-cost system to traditional or other modern lining techniques. Careful selection of lining support, the manner in which the lining adhesive is applied, and the means to set the bond differentiates this technique. The acrylic adhesive creates a “bridge” between the two canvases without impregnation. Choosing the right solvent for activation allows the acrylic adhesive to bond well to a wide variety of previously treated canvases, including wax-resin lined paintings. The bond has good shear resistance, though its peel force is lower. Delining of previously mist-lined canvases is therefore facilitated, allowing mist-lined canvases to be delined successfully, even over time.

short\_title: Demystifying Mist Lining

<A-head> Introduction

Lining canvas paintings has ever been a contentious action. Many canvas paintings have been lined, and at times relined. Age and condition have often not been prerequisites for implementing linings, as for a time it was seen as a preventative measure. Linings were intended to carry the load that the original damaged support could no longer bear, as well as solving a multitude of other structural issues, including consolidation and improvement of cupping and planar distortions. This often “one-stop” process was deemed long lasting, beneficial, and cost efficient. The type of lining carried out tended to be dependent on the training of the conservator-restorer, studio practice, and geographical location. Time has shown that the life span of linings is determinable, and the lining cycle continues.

The “moratorium” on lining called for after 1974 Greenwich conference on comparative lining techniques ({{Villers 2003b}}) never materialized, but the idea encouraged conservators to think of other options for structural repair. Full linings fell out of fashion, and strip-lining as well as thread-by-thread tear mending became standard practice. However, these options cannot be used for severely structurally compromised canvas paintings—thus, full lining continues to be necessary. The mist-lining process is still a relatively new technique and not yet part of many conservators’ toolkits. Familiarity with this process can expand the contemporary conservator’s repertoire and provide one of a few ethical solutions for structural support.

The mist-lining process was invented and developed by Jos van Och in the 1990s at the Stichting Restauratie Atelier Limburg (SRAL) ({{Fife, van Och, and Harrison 2017}}; {{Seymour and van Och 2005}};{{van Och and Hoppenbrouwers 2003}}). The term *mist lining* was coined by SRAL in the early 2000s and is now used to denote the technique, system, and process. The mist-lining system has roots in developments in structural treatments for lining canvases initially presented in the 1970s by Gustav Berger and Vishwa R. Mehra ({{Berger 1972a}}; {{Mehra 1975a}}; {{Mehra 1975b}}).

Mist lining is a noninvasive lining technique that involves spraying minimal amounts of an acrylic dispersion resin onto an auxiliary canvas before adhering that canvas to the reverse of the original support, often without tension. This open adhesive network is regenerated from the dry state, eliminating moisture. Solvent vapors (or gentle heat) are used to swell and tackify the adhesive.[[1]](#endnote-2) Bonding occurs under light pressure when the adhesive is activated. The system can be classified as a cold-lining method and forms a nap bond. The lining adhesive remains sandwiched between the two canvases with no impregnation of either textiles or decorative layers, which aids reversibility and negates any alteration of appearance.

# <A-head> Mist-Lining Methodology

The origins of mist lining lie in the desire to find an ethical replacement for more invasive lining techniques. Conservators commit to following a code of ethics. These emphasize that cultural heritage should be preserved for future generations while respecting aesthetic, historic, and intangible significances, as well as maintaining physical integrity. Conservators should, thus, limit treatment to necessary actions and strive to use compatible, non-altering products, materials, and procedures. Treatments should not interfere with future actions, examination, or analysis, and should be reversible.[[2]](#endnote-3) The non-impregnating, easily reversible mist-lining system complies with this ethos.

The mist-lining process is not a stand-alone procedure and must be considered in relation to other treatments that will be carried out on the painting, either before or after lining. The mist-lining methodology requires each problem to be handled independently. Simply put, the issues presented by the painting are analyzed and solutions to deal with each specific situation are found and resolved independently of lining. The lining action is, thus, kept separate from other required treatments. This enables the process to be highly adaptable and tailored to the individual case.

Mist lining is typically carried out after any reduction of planar distortions, overall treatment of the support, consolidation of paint layers, individual mending and/or strengthening of tears and holes, and removal of undesired superficial layers. Deformations are first flattened by prestretching the support and applying gentle and gradual lateral tension, often combined with humidification. Conversely, the mist-lining system will conform to any preexisting out-of-plane deformations and thus can be used to support (modern) canvas paintings devised with a more three-dimensional nature.

Consolidation of paint layers occurs as a separate step using an appropriate adhesive. Removal of varnish layers and overpaints is carried out prior to lining, though linings can be effectuated with any nonoriginal coatings left intact. Subsequent treatments often involve filling of paint losses, retouching, and revarnishing. After lining, it is imperative to consider fully the implications of the choice of solvent for varnish application, or the use of heat to impress texture in fills, as both solvent exposure and heat will affect the lining adhesive. Some examples of pretreatments implemented prior to mist lining are reported in the *Mist-Lining Handbook* ({{Seymour and Strombek 2022}}). Mist lining has been a successful choice for paintings that have a past structural treatment legacy, whether lined with glue-paste or wax-resin adhesives or both. Research has been carried out showing that the sprayed acrylic adhesive adheres well to canvases impregnated with wax resin ({{Contreras 2015}};{{Fischer 2002}}). This property enables the use of heat on these thermo-sensitive structures to be avoided.

The mist-lining process allows conservators to make the best choice for the needs of the individual canvas painting, rather than using a standardized technique to solve all issues. The choice to use the mist-lining system, thus, comes at the initial stage of the decision-making process—when considering the treatment plan—although the commitment to using the system can be altered, if necessary, as treatment progresses. The order of treatments, therefore, needs to be fully considered before the plan is confirmed. Our philosophy is to leave options open as much as possible. Each step of the treatment process is thought through, taking into account the consequences for subsequent procedures and future behavior of materials inherent in the system. For this reason, the pretreatments described have great importance.

The decision to use this system comes with a caveat. Expectations for results need to be tempered to accept surfaces that are not as “flat as a board” or linings that are not as “rigid as a plank.” This system does not produce the same degree of surface finish and stiffness provided by traditional linings. The natural drape of the canvas and texture of paint layers will not be significantly altered during lining. Any out-of-plane texture or impasto (including cupping) that exists before lining will be maintained. Consolidation problems are not resolved. The key, as mentioned, is to treat these defects, as necessary, prior to lining and to accept a certain natural “aged” look. (This may mean taking a different approach to dealing with clients or owners of paintings.) Nor does the system provide a stiff lining support. Mist lining moves away from the idea that the lining should carry all the stress within the laminate structure. Instead, a mist lining provides “gentle” support to the original materials, helping to mitigate dimensional changes induced by climatic variations, but not preventing them.

These aspects of the system remain open to debate. No complete scientific study comparing mist-lining results to those of other lining systems has been carried out. This “new” approach thus remains unprovable. However, numerous paintings, large and small in scale and presenting a wide variety of past treatments and conditions, have been lined with this system. These have performed well over the last thirty years, so perhaps the “proof is in the pudding.” Ongoing research aims to provide further insight and answers to these issues ({{Poulis, Seymour, and Yasmine 2020}}).

# <A-head> The Mist-Lining Process

As mentioned, the mist-lining technique uses an acrylic dispersion resin sprayed onto a prepared auxiliary textile support. The result is an open network, rather than a continuous layer of adhesive, which is allowed to dry on application. After the lining canvas is placed in position, the adhesive can be regenerated in-situ with solvent vapors. Bonding occurs under low pressure without the use of heat or moisture. The system effects a nap-bond with no impregnation of the original textile or migration into the decorative layers. This aids reversibility and avoids any change in appearance. Delining can be effected by applying peel forces (sometimes after solvent exposure) with little or no adhesive remaining attached to the original textile.

The technique requires little equipment and is easy to set up in the studio or on site. The low-pressure envelope can easily be adapted to accommodate paintings of different sizes or orientations (horizontal or vertical). Linings have been effectively implemented on all sizes of paintings, including large, oversized formats.[[3]](#endnote-4) Low-pressure tables can also be used, if a flatter lining surface is needed. Furthermore, the adhesive mixture and application process can be applied to effect strip-linings if a full lining is not desirable.

## <B-head> *Canvas Selection and Preparation*

Factors influencing the choice of lining canvas are the ability to develop a nap, flexibility versus rigidity (drape), responsiveness to humidity fluctuations, type of weave, and thickness of the canvas. The response rate of warp and weft threads to external conditions should be similar. Open-weave fabrics are preferred, as less tension is required to decrimp the fabric and to remount the painting. More importantly, solvent vapors can diffuse more readily through open-weave textiles so less solvent volume is required during activation.

A wide range of textiles have been used by the SRAL team over the years. Research into the mechanical properties of linen, polyester, and mixed-fiber textiles have been considered ({{Young and Jardine 2012}}). Choices are made on a case-by-case basis. The canvas requires a spun-yarn textile fabric, rather than a monofilament. Typically, open-weave lightweight natural linen fabrics or a fire-resistant lightweight spun-yarn polyester textile (Trevera CS) are used. Many other fabric types have also been experimented with and employed ({{Seymour and Strombek 2022}}).

The lining canvas may be tensioned prior to the application of the sprayed adhesive. Natural linen textiles are decrimped, only if the weave is dense, as the necessity is less for open-weave textiles. The desired tension of the lining textile is dependent on numerous factors. Firstly, the conservator should determine if the lining process will take place under tension or with either or both canvases in a free state. This decision may depend on logistics (size), the condition of the painting (first lining or relining), and future display (environmental factors). Tension is thus considered a variable in the process and cannot be quantified with a constant number; however, the tension applied when preparing the lining canvas should not be more than what will be required when remounting the painting. The aim is not to overstretch the adhesive when the lining is complete and to effect in an undisturbed point-to-point bond between the two canvases.

The size of the original support (including tacking margins) is masked out on the lining canvas to ensure that the edges of the lining fabric are not coated with adhesive. The surface of the stretched lining canvas is prepared by enhancing the nap. The yarn is disrupted to encourage fibers to protrude from the surface. Nap fibers are fluffed up using sandpaper worked gently in the same directions as the weave. The yarn should not be broken. Care is taken not to disturb the napped surface before spraying on the adhesive.

Interleaf textiles can be inserted as required to provide enhanced local (to support tears or holes) or overall stiffness. Nonwoven polyester or woven glass-fiber interleafs (adhered prior to lining with either Plextol mixtures or Beva 371 Film) are typically used at SRAL. These will mitigate the return of viscoelastic, out-of-plane deformations.

## <B-head> *The Adhesive*

Currently, two methacrylic ester-acrylic ester copolymer dispersions are mixed to obtain desired performance stiffness and solubility characteristics. Plextol D 540 and Dispersion K 360 (adjusted to pH 7) are used in a 30:70 ratio, but other formulations are being further investigated due to the discontinuation of Plextol D 540. The manufacturer of Plextol (Synthomer) has recommended as a substitute Plextol D 512.[[4]](#endnote-5) This and other alternatives (Plextol D 498 and Plextol B 500) are being tested to compare results at Delft University of Technology (TU Delft) ({{Poulis, Seymour, and Mosleh 2020}}).[[5]](#endnote-6)

A high-volume, low-pressure (HVLP) compressed-air spray gun is used to spray the adhesive onto the canvas in a fine mist. The spray mist only encapsulates the raised nap and does not impregnate the lining fabric or create a continuous coating. As only the nap is coated, the mechanical-physical properties of the canvas are unchanged; it remains flexible and able to conform to the drape and morphology dictated by the original canvas.

The optimum result is achieved when the adhesive is sprayed from different angles in more than one layer. The aim is to use as little adhesive as possible, something that is currently judged through experience. The coating should remain open and “fluffy” so as to allow the solvent vapors easy access. A thinner layer of adhesive will react more quickly to the solvent vapors and will need less pressure to create a bond, but the bond achieved will be more resistant if the adhesive layer is more substantial. It is, however, never the aim to have a thick layer of adhesive! The ultimate thickness of the sprayed adhesive layer is considered one of the key variables of the system. We suggest those new to the system practice these decision-making processes on mock-ups to gain insight into such variables. [**Figs. 9.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-1) and [**9.2**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-2) show an example of the dried adhesive layer applied to an open-woven linen canvas.

The sprayed adhesive is allowed to dry before lining occurs. The two canvases are brought together before a subsequent bond is effected within a low-pressure envelope. The original canvas is carefully positioned on the lining canvas in contact with the sprayed area. Smaller paintings can be lined face up with the lining canvas loomed or untensioned, while larger paintings are typically lined without being tensioned and face down. In the latter case, the lining canvas is often rolled into position over the exposed reverse of the original. It is imperative that placement is carried out carefully and precisely, so as not to flatten the fluffed, open network of the adhesive and to ensure that the weave of the lining canvas aligns with that of the original. Dragging the original over the sprayed adhesive surface will deform the adhesive surface and compress it into a continuous coating.

## <B-head> *The Low-Pressure Envelope*

The low-pressure envelope consists of two differing thicknesses of high-density polyethylene (HDPE) plastic sheeting and a ring of perforated pipes connected to a centrifugal fan (or vacuum cleaner) ([**fig. 9.3**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-3)). Both plastic sheets should be solvent (and heat) resistant. The plastic sheeting is typically sourced at local building merchants. The thicker plastic sheet can be stretched to a working frame that is larger than the lining canvas or taped to a flat surface such as a table or floor. The thinner, unstretched plastic sheet should be flexible enough to accommodate surface topography (e.g., impasto, cupping). In some cases, the setup can be reversed.

The design of the low-pressure envelope is another key variable of this adaptive system. Varying the thickness and tension of the plastic sheeting will modify the pressure exerted. The flexibility of the plastic sheeting allows an even pressure to be applied over the whole surface area as the plastic conforms to the topography of the structure within the low-pressure envelope. A stiffer sheet of plastic (such as Melinex) would exert pressure on high points and the force exerted would be imposed on a smaller area. Using a too-stiff membrane could potentially cause moating or even flatten impastos; it could also push out-of-plane structures, such as seams, forward. Slight deformations in the canvas can, however, be manipulated, but the system does not exert sufficient pressure to push severe deformations into plane.

Air is extracted from the low-pressure envelope using a ring of perforated pipes (diameter about 2 cm). We typically use PVC pipes intended to house electrical wires in walls, which are sourced from local building merchants. Other improvised versions could be utilized, such as garden hosepipes or washing machine hose. The tubes should not deform when air is extracted. Lengths of up to 3 meters can be bought and modified to the desired size. Connection pieces make it possible to extend beyond this dimension and connect at the corners. The ring should be a good 20–30 centimeters wider than the (loomed) lining canvas. Both plastic sheets used for the envelope should be larger than the ring. Holes are drilled into one side of the pipes at regular intervals. When assembled, all corners and joints are taped together to ensure the ring maintains its shape and does not disconnect during lining. A T connector is used to attach the ring to the centrifugal fan. When placed in the envelope, the pipes are covered with a textile “sock” to ensure that the plastic sheeting is not drawn into the holes.

Air is extracted from the center of the envelope by including a piece of cloth slightly larger than the ring system. We call this a “breather.” It is typically placed on top of the stiffer membrane. Note that there should also be soft material placed under the envelope, outside the system, to ensure the envelope is floating and that, if punctured, it will not be sucked down to the flat surface, which would induce excess pressure during lining.

When the centrifugal fan is turned on, air is extracted from between the two plastic membranes evenly. Sharp edges (e.g., working loom members) should be padded with cloth coverings. These also aid in the extraction of air from the center of the envelope to the ring system. Thin nonwoven fabrics can also be placed over the paint surface if desired; however, these stop the upper plastic membrane from following the morphology of the surface and may diminish the bond achieved. The exact conformation to the surfaces (upper paint and lower textile) by the plastic sheets permits a point-to-point bonding at a low, even pressure.

Although the low-pressure envelope is used in the lining process it can also be used for a variety of other conservation treatments. Further information on the materials used is provided in the *Mist-Lining Handbook* ({{Seymour and Strombek 2022}}). We advise some experimentation prior to determining the setup for the low-pressure envelope.

## <B-head> *Bond Formation*

As opposed to a continuous coating, when dried, the open adhesive network can effect a light bond with a very small amount of adhesive. A dried thick, continuous (stiff) coating of an adhesive will need to deform or soften in order to uniformly connect the two undulating surfaces. In this case, heat and high pressure can expedite and ensure a good bond, but often at the expense of paint modification and impregnation of nonoriginal materials into the original textile and decorative layers. In the mist-lining system, the “fluffy” adhesive layer has a volume that accommodates the distance between the two woven textiles. During lining, gentle pressure is sufficient to ensure that the two canvases remain connected.

The adhesive is reactivated in-situ using solvent vapors. Solvent exposure induces swelling, allowing the adhesive to regenerate and become tacky. The volume of solvent vapors required to regenerate the adhesive is carefully calculated to ensure that the adhesive swells and becomes sticky, but does not dissolve, ensuring that the adhesive remains between the lining and the original canvas. Solvent selection is dependent upon a number of factors, including the sensitivity of paint and varnish layers, the condition of the reverse of the original support, any remnants of previous lining adhesives, and, of course, the solubility parameters of the adhesive. Acrylic dispersions are sensitive to a range of solvents, including alcohols and aromatic hydrocarbons.[[6]](#endnote-7) Mixtures of these can also be considered. The choice of solvent(s), duration of exposure to solvent vapors, and the pressure exerted within the low-pressure envelope will affect the bond strength achieved.

Testing ensures that the best solvent is selected. We recommend using smaller sections of a representative lining canvas sprayed with a similar amount of adhesive to test for an effective representative bond. Sections are placed on the reverse of the original and exposed to different preselected solvent vapors for the same amount of time. The sections are left under weight until the solvent has evaporated, and then each is peeled away evaluating the effectiveness of the bond. Experience builds an expectation of results, but tests do ensure a better understanding of the individual variables that can be implemented for particular cases.

## <A-head> Effecting a Mist Lining

The lining is carried out within the low-pressure envelope ([**fig. 9.4**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-4)). First, the solvent vapors are introduced into the envelope using a “solvent-delivery cloth”—typically, an open-weave cotton cheesecloth. The ability of the solvent-delivery cloth to absorb the solvents used will dictate the volume of solvent that is needed; the volume used at SRAL is 60 ml of solvent per square meter of cheesecloth. The cheesecloth should be slightly larger than the area of sprayed adhesive, as it will shrink slightly as the fluid solvent is absorbed.

The solvent-delivery cloth is rolled up and encapsulated in plastic (clingfilm or Saran wrap) before the solvent is introduced. The solvent is injected into the package using a needle and syringe. Sufficient time must be allowed before placing the solvent-delivery cloth in the envelope for the solvent to spread evenly throughout the cloth. When the solvent has evenly dampened the solvent-delivery cloth and the lining set up is established, it is rolled out inside the envelope, placed at the reverse of the lining canvas, as can be seen in [**fig. 9.5**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-5). Placing the cloth in the envelope and rolling it out inside the envelope should be practiced until it can be done quickly enough that solvent is not lost through evaporation (during the application process).

The solvent vapors, thus delivered, defuse through the lining fabric to the open adhesive network. Once the adhesive is tacky (but not dissolved), the solvent-delivery cloth is removed; typically, this takes between ten and twenty minutes. Air is extracted from the envelope to expedite the activation time, but continual pressure is not necessary at this stage. The solvent-delivery cloth should be replaced with a dry cloth to facilitate solvent evaporation during bond formation.

Once the solvent-delivery cloth has been removed, the air is extracted from the low-pressure envelope. This causes the two canvases to be drawn together and the reactivated, (thin) adhesive spray coating can bridge distance between the two. Pressure is maintained until the majority of solvent vapors have evaporated and the adhesive is reset. The amount of pressure in the envelope is determined by the degree of air extracted by the centrifugal fan and the thickness/stiffness of the plastic sheeting. Typically, values of 90 mbar are reached and maintained for about sixty to ninety minutes. For safety reasons, as solvent vapors are being passed through an electrical motor, an attendant should be present at all times during the lining. The risk of sparks igniting dust particles within the motor should be prevented by using the motor exclusively for air extraction. Air exchange values can be used to reduce risk.

We recommend that conservators experiment and become comfortable with the system variables before undertaking a mist lining. Results are impressive ([**figs. 9.6**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-6) and [**9.7**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/fig-9-7)). Aspects to consider are pretreatments, thickness of the adhesive layer, the type of solvents and lining canvas selected, and the setup of the envelope.

# <A-head> Mist-Lining Dissemination

The SRAL team has imparted our knowledge and experiences of the Mist-Lining system to the wider conservation field over the years (see Appendix for a chronology of workshops and conferences disseminating the mist-lining system). Students studying conservation in The Netherlands have been instructed in the system since the early 1990s. International interns, fellows, and junior conservators working at SRAL over the past thirty years have all used the system. Papers have been written describing it, and presentations have been given at conferences (see [Barbosa et al.](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/paper-54) and [Brandt and Volbracht](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/9-Seymour/paper-13) in this publication); {{Costantini 2013}}; {{Iaccarino Idelson and Garofalo 2019}}; {{Ruuben and Robbins 2011}}). Dissemination has had successes and failures and has led to further modifications in the system. The expertise of the system still remains largely in-house at SRAL, however, and the use of this relatively new system is not widespread. Because the system is adaptive and tailored to the needs of the painting, it is full of variables that may be difficult to grasp if not encountered in practice. Thus, confidence in considering this non-invasive and gentle approach to the structural repair of canvases may be lacking in many conservators less familiar with the system.

In 2019, with the generous support of the Getty Foundation’s Conserving Canvas Initiative, SRAL organized the Mist-Lining Workshop to further disseminate this technique and share our experiences. The aim was to provide midcareer conservators from different world regions with hands-on experience of this alternative option for the structural repair of canvas paintings. At the same time, this global group also brought new thoughts and inspired further adaptations and developments of the mist-lining system ({{Nadeau et al. 2020}}). The workshop was documented in film and print. The video, produced by Bigeye Productions, can be viewed on YouTube for further insight.[[7]](#endnote-8) The resulting *Mist-Lining Handbook* ({{Seymour and Strombek, 2022}}) provides a valuable resource to the field. It is full of information on case studies, material information, and sources. Once practiced, the mist-lining system’s variables become something that the conservator can use to tailor treatment to the particular needs of each case. The materials and equipment needed are low cost and relatively easy to source locally. We hope that these new resources will give this viable system new traction as a treatment option.

# <A-head> Conclusion

The mist-lining system remains frequently used at SRAL. A numerical quantification of paintings treated with this system has not been carried out. However, it is safe to say that over the past thirty years, some hundreds of paintings, belonging to local, national, and international collections have been treated by the SRAL team using this process. To date, none of any of those so treated have been returned due to failure of the lining. This body of work provides empirical confirmation of the success of the system. Of course, failures—or rather, disappointments—have occurred. These setbacks are typically evident immediately after lining, before the artwork is returned to its collection, and thus can be resolved immediately. Reflecting on these complications provides learning lessons for the SRAL team and encourages further developments or adaptations of the system.

Conservation ethics have shifted over the past decades towards a minimal approach and avoidance of invasive treatments. The change in ethos to the structural repair of canvases allows the conservator to identify and find solutions to separate problems presented by the painting. Lining has become, with the mist-lining system, a custom action. There are, of course, drawbacks to lining with this system, such as covering the original canvas from view and using solvent vapors to regenerate the lining adhesive, because those vapors permeate throughout the painting structure. However, the choice of adhesive and its relatively long-term chemical stability mean that the adhesive bond can be reversed in the future. The original reverse of the canvas can thus be regained, if necessary, as the adhesive remains primarily on the lining canvas when delining.

The idea that the original canvas will never be the same again after a lining is carried out can now be left behind. The mist-lining system is noninvasive and can provide additional support for canvases without changing the stiffness of the original canvas and without influencing the appearance or saturation of the paint layers. While this process may not be the only modern solution to resolve this new way of thinking, it is an effective and versatile technique that has been used successfully for the last thirty years at SRAL and elsewhere to line a vast number of damaged paintings—and to reline paintings previously lined with glue-paste or wax-resin adhesives.

# <A-head> Appendix: Chronology of Workshops and Conferences Disseminating the Mist-Lining System

1995–2006: Annual workshops for SRAL post-master’s students

2006–2020: Biannual workshops for post-graduate University of Amsterdam students

2007–2008: Workshop and treatment of Hubert Vos *Empress Cixi* at the Summer Palace, Beijing

2008: Workshop at Academy of Fine Arts, Dresden

2010: International symposium and workshop on lining techniques at SRAL.

2010: ICOM-CC Working Group Paintings “Current Practice and Recent Developments in the Structural Conservation of Paintings on Canvas Supports” at Metropolia University of Applied Sciences, Helsinki

2011: Ripping Yarns: Traditions and Advances in the Structural Repair of Canvas Paintings, British Association of Paintings Conservator Restorers conference at the Courtauld Institute of Art, London

2011–2014: Workshops at SRAL for students from the Courtauld Institute, London (2011); Hamilton Kerr Institute, Cambridge (2012); Ecole Supérieure des Arts, Saint Luc, Liege (2013); New University (NOVA), Lisbon (2014)

2012: Glue-Paste Linings: Tradition, Performance and Stability, conference held at Thyssen-Bornemisze Museum, Madrid

2015–2018: Workshops for professions at M. A. Vrubel Museum, Omsk (2015); Indira Gandhi National Centre for the Arts, New Delhi (2016); Indian National Trust for Art and Cultural Heritage, Kolkata (2016); the State Tretyakov Gallery, Moscow (2018)

2019–2021: Getty Foundation, Conserving Canvas Initiative, Mist-Lining Workshop (2019) and Pilot Virtual Online Mist-Lining Workshop (2021)

# <A-head> Notes

1. . Acrylic adhesives are thermoplastic. Thus, gentle heat (about 50°C) is also sufficient to tackify the dry adhesive and create a bond. [↑](#endnote-ref-2)
2. . European Confederation of Conservator-Restorers’ Organisations (E.C.C.O.),

   “Professional Guidelines I: The Profession” (2002): https://www.ecco-eu.org/wp-content/uploads/2021/03/ECCO\_professional\_guidelines\_I.pdf; “Professional Guidelines II: Code of Ethics” (2003): https://www.ecco-eu.org/wp-content/uploads/2021/03/ECCO\_professional\_guidelines\_II.pdf. [↑](#endnote-ref-3)
3. . *Panorama Mesdag* project (1986–1996). The *Panorama* was painted by Hendrik Willem Mesdag and workshop in 1881; it is 14.70 m high x 114.70 m in circumference ({{van der Donk, de Herder, and van Lier 1996}}). See also Panorama Mesdag Geschiedenis en restauratie van een schilderij zonder grenzen: https://www.npo.nl/close-up/11-07-2015/AT\_2037854. While not technically a mist lining, the Beva 371 lining adhesive was flocked and the heat-activated bond was set using a low-pressure envelope developed by Jos van Och. This remains the largest known painting lined (vertically) in situ. [↑](#endnote-ref-4)
4. . Email correspondence between Kate Seymour and Thomas Bernhofer, technical service manager, Coatings, SBU Functional Solutions, Synthomer, March 28, 2018. See also http://www.synthomer.com. [↑](#endnote-ref-5)
5. . Until recently, tests at SRAL have been empirical in nature, conducted on mock-ups or historical material (such as old, removed lining canvases or deaccessioned paintings). The lining process and specifications have been adjusted and tested for specific cases. Samples were analyzed between 2014 and 2017 by Dr. J. A. (Hans) Poulis (Director of The Adhesion Institute, TU Delft) and a team of interns at TU Delft, Aerospace Division as well as students from the University of Amsterdam as part of Master Thesis research. Research is continuing and will be published in due course. [↑](#endnote-ref-6)
6. . The toxicity of the solvents can also be considered. Personal protective equipment (PPE) can be used to safely work with toxic solvents. Environmental factors and sustainability issues may also influence solvent selection. [↑](#endnote-ref-7)
7. . “De-Mystifying Mist-Lining,” instructional and documentary movie about the mist-lining system (2020), produced by Benjamin Brack and Akkie Brack-Sewalt, Big Eye Productions: https://www.youtube.com/watch?v=jU-QwEfYt44&feature=emb\_title. [↑](#endnote-ref-8)