

# Creative problem solving in paper conservation: 4 case studies of complex treatments

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## ABSTRACT

This paper will focus on the treatment of four very different artworks, and the challenges faced in achieving physical stability and good aesthetic results. The first case study discusses the removal of a masonite backing from a Fred Williams artwork. Several different techniques were applied over a number of stages. Large stains were subsequently reduced through spot treatment on suction table. The second treatment example is of a National Trust artwork in watercolour and graphite, entitled 'Study of a Possum'. The complicating factor of this treatment was the removal of the poorly applied varnish layer. Severe discolouration due to the uneven application of the varnish was later reduced significantly. The third case study details the removal of a self-adhesive foam core board from a Chinese watercolour artwork on oriental paper. The media of this artwork was sensitive to most solvents commonly used in this kind of adhesive removal. After backing removal, severe foxing, discolouration and 'blooms' could then be reduced locally. The final treatment covers the removal of a mat board and multi-layered backing from a gouache caricature of Frederick Coleman, created for Vanity Fair in 1907. The water sensitive media of the artwork required an innovative approach to reduce severe foxing and discoloration. A wet treatment was challenging but not impossible. The successful results show how creative problem solving is one of the most valuable tools of a paper conservator.

**Keywords** Masonite, removal, foam core, varnish layer, stain reduction, gouache

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## INTRODUCTION

As conservators we face challenges with every treatment we undertake, some more complicated than others. With each treatment we endeavour to achieve the best results possible for the artwork, primarily their physical stability being the main concern, whilst achieving good aesthetic results. As is common in private conservation there is little time for research into different techniques for the treatment of challenging artworks and therefore we rely extensively on testing and problem solving to overcome these obstacles. In the case studies to follow, the challenges of difficult backing removals, treatment of artworks with water sensitive media, and removal of varnish from paper artworks will be outlined as well as how some of the problems encountered were overcome.

The treatments outlined in this paper are ones that occur from time to time in the paper conservation laboratory, however there is little discussion in conservation literature about ways to approach these types of treatments. This paper therefore, outlines approaches taken and endeavours to share and bring forward discussions on challenging and seldom published treatments.

### CASE STUDY 1 – REMOVAL OF A FULLY ADHERED MASONITE BACKING FROM A FRED WILLIAMS ARTWORK; OIL ON ARCHES PAPER

Masonite board was first invented in 1924 by William H. Mason in Laurel, Mississippi (Masonite Corporation 2012). It has had many uses in the building and manufacture industries as well as in the artist world – being used for supports for

paintings and in framing primarily. This was mostly due to its rigidity and low cost (S. Brown 2013, pers. Comm., 18 November). Unfortunately this material is highly acidic due to its material makeup (wood chips) and emits volatile pollutants which can cause damage and discoloration to the paper and media. As well, the adhesives used to adhere the artwork to the masonite board can contribute to the damage sustained to the artwork (Pavitt 2012). Therefore masonite board should not be in direct contact with artworks for any extended period of time as it will likely have some detrimental effect on the artwork.

### FREDERICK RONALD WILLIAMS (1927 – 1982)

Fred Williams was an Australian painter and graphic artist who revitalized landscape painting of Australia through the '... restrained colours, tonal contrasts and classic simplicity of style in his mature work ...' (McCulloch 1968, pp. 585-586). Williams worked primarily with oils on canvas, paper, and composition board.

### DECIDING TO REMOVE THE MASONITE BACKING BOARD

There are factors to be considered when deciding whether or not to remove a backing from an artwork. Whether the artist him/herself applied the backing and how the backing material is affecting / will affect the artwork chemically and physically are two such factors which should be considered. As this artwork was not only full adhered to an acidic masonite backing board but also had numerous large stains it was deemed to be beneficial to the artwork to remove the acidic masonite board and reduce the stains.

The removal of the masonite backing board was complicated further by the 3-dimensional quality of the artwork (Figure 1).



Figure 1. Before treatment - Fred Williams artwork – oil on Arches paper

The oil paint was thickly applied in some areas and a few of these areas were cracking. Risk of further cracking and potential loss was mitigated by making a ‘cushion’ by placing a layer of reemay on top of a thick felt. The artwork was then placed, face down, on top of the ‘cushion’ layers and then clamped in the corners – avoiding placing pressure on the thick areas of oil paint.

The backing then had to be taken off layer by layer. Each layer was removed as evenly as possible to ensure no uneven pulling/tension would occur to the Arches paper. A chisel was used initially until it was pointed out by Julian Bickersteth that the use of a wood plane would provide both better control and evenness of removal. Once implemented the use of the wood plane was found to be the better method. Once the backing had been reduced to a thin layer, scalpels were used to remove the final layer – flake by painstaking flake. During the final stages of backing removal some paint was found on the verso of the artwork. Presumably these areas of paint occurred during the artworks creation. These areas were not dislodged / damaged by the final steps of the backing removal.

The backing removal was conducted over a series of three weeks with a total of 24 hours being used to successfully remove the backing. Health and safety were a concern in this backing removal process. It was ensured that when working on the backing removal breaks were taken at continuous intervals to ensure no repetitive strain injuries occurred. As well, a dust mask and protective glasses were worn during the backing removal process. Throughout the backing removal a vacuum was used, especially at end of day, to minimize dust levels.

Once the masonite backing was fully removed, the next treatment stages for this artwork were continued by Kate Papierniak, then Senior Paper Conservator at ICS. Media tests were conducted again (initially carried out before backing removal) and the artwork was washed on suction table with 70% ethanol and de-ionised water. Once washed, the foxing stains were reduced with a mixture of 1.5% hydrogen peroxide with a few drops of ammonia in de-ionised water, which was applied locally to the stains. After several applications the artwork was again washed on suction table, paying particular attention to the areas where the stain reduction solution was applied.



Figure 2. After treatment - Fred Williams artwork – oil on Arches paper

A new archival quality lining of a heavy gsm Japanese tissue was applied using the tension method and Zen Shofu paste (Figure 2). The artwork was lightly sized with Klucel G in ethanol during the lining application. As well, cracking media was consolidated with Klucel G in ethanol. Some retouching was required in areas where stains were reduced. This was done with watercolours over a film of Klucel G in ethanol. The artwork was alkalisied with an application of magnesium oxide to the verso.

## CASE STUDY 2 – ‘STUDY OF A POSSUM’

This artwork was in quite poor condition when it came to ICS for assessment from the National Trust. There is not much known about the provenance of this artwork as it was not signed or dated by the artist. It was fully adhered to a thick, acidic card. However, yellowing and discoloration to the artwork was primarily caused by an unevenly applied varnish layer which was deteriorated and cracking (Figure 3). It is unknown as to when the varnish layer would have been applied. The varnish layer may have been applied by the original artist, or by another interested party at a later date. It was decided to remove the varnish layer as it was causing severe damage to the artwork.

Unfortunately limited literature was found on the removal of varnish layers that have been applied to artworks on paper. Varnishes applied to works on paper were traditionally utilitarian objects (maps, globes, etc.), decorative paper based objects (prints, wallpaper, photographs, etc.) (Young 1999) and working sketches done with friable media such as charcoal and pastels (Ellis 1996). Varnishes were also applied to artworks on paper to imitate the appearance of oil paintings for competitive sale. However, generally varnishes were applied to protect artworks (primarily paintings on canvas) from deterioration, moisture, surface abrasion, dust and atmospheric pollutants. Throughout the 19th and 20th centuries the focus of the market for fixatives shifted from basic adhesion to overall protection (Ellis 1996). These are likely to have been factors in the decision to put a varnish layer on this artwork.



Figure 3. Before treatment - Study of a Possum

This artwork had a more typical backing consisting of a card, that had become acidic over time, but was less time consuming to remove than that in case study 1. The majority of the acidic card backing was removed dry with spatulas and scalpels. An application of approximately 5% high viscosity methylcellulose was used as a poultice to aid the removal of the final layer with spatulas.

Media tests were conducted (prior to backing removal) and it was found that ethanol was the most effective for removing the varnish layer and it did not affect the underlying media. The varnish layer was then removed with ethanol swabs. This process took approximately six hours over a two day period. There were concerns as to whether this removal process would cause tide lines in the primary paper support but this was found to not be the case after testing in the lower left hand corner of the artwork.

Upon removal of the varnish layer a wax residue was noticed in the bottom right hand corner. This was reduced with a scalpel. Any residual wax in the paper was reduced by placing the artwork, recto side down, on the suction table and applying acetone through the verso.

Once the varnish layer was removed it was possible to reduce staining on the artwork. The artwork was washed by spraying out with 100% ethanol on the verso and then placing it in a bath of de-ionised water. There was no real noticeable shifting of the stains or deterioration noticed after one bath. Upon drying it was noticed that a slightly 'cloudy' film was on the recto of the artwork. It was determined that a residue of the varnish must still be present on the artwork and therefore it was decided to place the artwork on the suction table face down and spray it out through the verso with ethanol. This was done several times to ensure that all the varnish residue was removed from the recto of the artwork. The artwork was then sprayed on the verso with 70% ethanol and place



Figure 4. After treatment - Study of a Possum

on the suction table, recto side up. Considerably more deterioration by-products were drawn out of the artwork through this method.

Some stains remained after the artwork was washed. These were reduced with a mixture of 2% hydrogen peroxide with a few drops of ammonia in de-ionised water, which was applied to the verso and recto of the artwork. Once the stains were satisfactorily reduced the artwork was then washed successively on suction table with 70% ethanol.

The artwork was sized through successive application of approximately 1% low viscosity methylcellulose and approximately 1% high viscosity methylcellulose. The sizing solutions were applied by spraying on the recto of the artwork. A sizing application was deemed necessary for this artwork due to loss of sizing. The artwork was then buffered with an alkaline solution of magnesium oxide by spray application to the verso.

A lining of Japanese tissue was applied to the artwork with the tension method and Zen Shofu starch paste (Figure 4). The lining was applied to ensure the long term physical stability of the artwork and for ease of handling. Inpainting was required in areas of insect damage (skinning of paper) which was done with watercolours over a barrier layer of approximately 5% high viscosity methylcellulose.

### CASE STUDY 3 – CHINESE WATERCOLOUR ON ORIENTAL PAPER

The main difficulty in this case study was in the removal of the self-adhesive foam core board that the artwork was fully adhered to. The artwork was severely foxed and there were 'blooms' that had occurred around some of the media. It



Figure 5. Before treatment - Watercolour on oriental paper

could only be conjectured that the ‘blooms’ had occurred from the adhesive on the foam core board, as it did not appear to be caused by the way the media was applied (Figure 5).

Foam core boards have been manufactured since 1957 (FoamBoards 2013) and have been used for picture framing and art mounting since shortly after that time.

Some artists and even framers commonly apply self adhesive foam core boards to light weight artworks, in particular artworks done on oriental papers even though they are difficult to apply. When fully adhered correctly they can give a smooth and flat finish to the artwork. This however, in the long run can cause issues with the longevity and stability of the artwork, especially if non-archival clad boards are used.

As you can see from the before treatment photograph (Figure 5) the artwork was severely foxed, likely due to poor framing materials and unstable environment. Media tests were done to establish which solution could be used to remove the self adhesive foam core backing. It was determined that toluene was the only chemical which could dissolve the adhesive layer. However, toluene was found to cause movement of some of the media (red media). White spirits was found to not solubilise any of the media so it was decided to consolidate the affected media with paraloid B67 in white spirits by application of a brush. Once dried, the backing removal commenced. First the backing was reduced by removing the very back layer and the majority of the foam core with spatulas. The artwork was then placed face down on blotters inside of a fumehood. Toluene was then applied through the verso with a brush and a spatula was used to separate the remaining backing layer and adhesive from the verso of the artwork. This had to be done in stages and was conducted over a period of three days with a total of four hours to complete the removal.

Once the backing was separated from the artwork the consolidant was then removed on suction table with successive applications of white spirits with a brush under fume extraction. The artwork was then washed on suction table with de-ionised water. It was during this part of the treatment that the ‘blooms’ washed out of the artwork. As well the foxing spots were significantly reduced during this stage of the treatment. The foxing spots were further reduced with a spot application of 2% hydrogen peroxide with a few drops of ammonia in de-ionised water. The artwork was then placed on the suction table for successive washes with de-ionised water.



Figure 6. After treatment - Watercolour on oriental paper

A lining of light-medium gsm Japanese tissue was applied with Zen Shofu starch paste using the tension method. The lining of this artwork was done to ensure long term physical stability and ensure ease of handling for reframing as the artwork was already on a very light gsm paper.

Some retouching was required in areas where the foxing stains were on areas of media. This was done with watercolours over a barrier layer of approximately 5% high viscosity methylcellulose (Figure 6).

#### CASE STUDY 4 – ‘FREDERICK COLEMAN’ – GOUACHE CARICATURE FOR VANITY FAIR 1907

The main difficulty in the treatment of this artwork was the reduction of stains on a gouache artwork which was fully adhered to both mat and backing boards.

##### SIR LESLIE MATTHEW WARD (1851 – 1922)

This artwork was produced by ‘Spy’ – Leslie Ward in the early 1900’s and was published in Vanity Fair in 1907. Leslie Ward was a British portrait artist and caricaturist who regularly had his portraits (both drawn and painted) published in Vanity Fair under his pseudonym ‘Spy’ (National Portrait Gallery 2013, Wikipedia 2013).

##### ‘FREDERICK COLEMAN’ – GOUACHE CARICATURE

The artwork was framed with non-archival materials and had been exposed to a high moisture environment causing mould growth within the frame and the enhancement of foxing stains on the paper support (Figure 7). When the artwork was removed from its mould affected frame, mould spores were reduced with a low suction HEPA vacuum and soft brush. The artwork was also placed in a 70% ethanol chamber for half a day to help deactivate air borne mould spores.

Upon initial assessment of the artwork it was believed that the mat and backing, which were fully adhered, were the originals. However, once the mat removal processes was underway it became apparent that the artwork had been matted at least once before, if not several times. The old mat(s) had also been fully adhered and caused damage when removed. There were significant holes and losses in the paper support under the matted areas (Figure 8).



Figure 7. Before treatment - 'Frederick Coleman'

Initially the removal of the mat was conducted with the application of a heated spatula on blotter paper dampened with de-ionised water and then a spatula was used to reduce the mat board. Once the level of the paper support was reached, it soon became apparent that this method was not going to help in the removal of the final adhesive layers, which appeared to be a type of very strong PVA. This adhesive was reduced with a scalpel down to a thin layer and then reduced further with ethanol and acetone swabs. The removal of the backing was not as straight forward as it initially appeared as well. There were several paper based board layers, which were reduced mechanically with scalpels and spatulas. The final layer was discovered to be a glassine layer, which was removed with ethanol swabs and a spatula.

Due to the primary media of the artwork being gouache it was highly likely that it could be 'activated' with water. After media tests it was proven that ethanol did not move or 'activate' the media. It was decided to use 80% ethanol to wash the artwork on suction table. The ethanol / de-ionised water mixture was applied with an air gun attached to compressed nitrogen. The compressed nitrogen gas was found to give an even and dry air pressure and therefore was found to be a better method than the air compressor that had been previously used for such applications. Once sufficiently washed, the stains on the artwork were reduced with an application of 1% sodium borohydride dissolved in ethanol. In order to avoid applying the stain reduction solution to non-stained areas (i.e. media areas) a 'cut out' was made of the caricature. This was made by drawing an outline of the subject on Mylar, cutting the figure out of the Mylar and then producing multiple cut outs on blotter paper.

These 'cut outs' were placed on top of the caricature and held in place with glass weights to prevent it from moving while the stain reduction solution was applied. The 1% sodium borohydride in ethanol was then applied to the stain affected areas with the air gun attached to nitrogen gas. The stain



Figure 8. After treatment - 'Frederick Coleman'

reduction solution was applied approximately six times, after being allowed to dry each time, to ensure stains were reduced to a satisfactory degree. This was done over two days. Once the stains were satisfactorily reduced the artwork was placed on the suction table and sprayed with 80% ethanol with the air gun and compressed nitrogen.

After the artwork was wash sufficiently it was sized with a spray application of Klucel G in ethanol through the verso. A lining of medium weight Japanese tissue with Zen Shofu starch paste was applied using the tension lining method. A lining was applied to this artwork to ensure long term physical stability and due to the bottom of the artwork being in such a fragile and fragmented condition from previous mat board removal(s).

A few areas of stain reduction were slightly lighter than their surround so these were retouched with watercolours over a barrier layer of Klucel G in ethanol (Figure 8).

## CONCLUSION

As demonstrated in the treatments outlined above a lot can be gained by a little creative problem solving in conservation treatments. The physical and chemical stability of each artwork was improved through these treatments and good aesthetic results were obtained where stains were of concern.

The key learning experiences from these treatments include: the ease and control provided by the use of a wood plane in the removal of masonite backing boards; self adhesive foam core boards are relatively easy to remove; varnishes, although relatively uncommon on paper artworks, can be successfully removed; and it is possible to treat gouache/ water sensitive media works on paper which are badly foxed and stained. It is hoped that through this paper more discussions and publishing of similar challenging treatments will be encouraged.

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## MATERIALS

### Ethanol

96% vol  
Technical grade  
Supplier: VWR

### Acetone

Technical grade  
Supplier: VWR

### Compressed nitrogen

Supplier: Supagas

### Zen Shofu wheat starch

Supplier: Talas

### Methylcellulose

400cps  
Supplier: Talas

### Methylcellulose

4000cps  
Supplier: Preservation Australia

### Klucel G

Supplier: Talas

### Watercolours

Winsor & Newton  
Supplier: Oxford Art Store

### Hydrogen peroxide

35%  
Supplier: Chem Supply

### Ammonia

32%  
Supplier: VWR

### Sodium borohydride

98+%  
Acros Organics  
Supplier: Thermofisher

### White Spirits

Diggers  
Supplier: Bunnings

### Toluene

Supplier: VWR

### Magnesium oxide

Preservation Technologies, L.P.  
Supplier: Talas

### Paraloid® B67

Supplier: Talas

### Cotton Wool

Cutisoft Cotton Wool  
Supplier: Clifford Hallem

### De-ionized water

### Polyester film - Mylar

### Reemay

## AUTHOR BIOGRAPHY

**Wendi Powell** holds a Bachelor of Arts (Archaeology), a diploma in Heritage Resources and a diploma in Collections Conservation and Management. She has worked for both private and small institutions since graduating in 2004. Since 2007 Wendi has been working at International Conservation Services, initially as an objects conservator and since 2010 as a paper conservator. During this time she has worked on a wide variety of objects and works on paper.

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