THE FACTS ON FLÜGGER® ACRYLSPALTER:

A study of the properties of a commercial filler

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Abstract

The properties of Flügger® Acrylspalter were tested in comparison to Polycell Fine Surface Polyfilla®. Investigations were made into the fillers' suitability as substrates for paint and the effects of ageing on shrinkage, flexibility and solubility over time. Fourier Transform Infrared spectroscopy (FTIR) was used to analyze the chemical properties. The aim of this study was to test Flügger's® suitability for use in conservation.

Introduction

Commercially prepared fillers are enjoyed for their time efficiency, workability and variety. Some have undergone rigorous testing by the conservation community, but others have managed to avoid scrutiny, such as Flügger® Acrylspalter (Fig.1). Although praised by conservators for its physical properties, it seems to have received minimal attention in terms of materials testing. This study has set out to change this by evaluating the putty against Polycell Fine Surface Polyfilla® (Fig.1), an approved conservation-grade filler.

Fig.1: Flügger® and Polyfilla® in their packaging.

Experimental

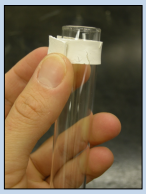

Fig.2: An aged Polyfilla® sample undergoing flexibility testing.

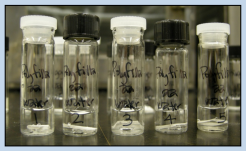

Fig.3: Aged Polyfilla® samples during solubility testing.

Study	Description
Painting Tests	Three types of paints were used to investigate the ease of application and removal of paint: acrylic (Liquitex®), gouache (Winsor & Newton) and watercolour (Winsor & Newton). Ivory black was chosen as the colour for all three types. Five samples of each filler were tested for each type of paint, for a total of 30 samples. Quantitative analyses were carried out with a colourimeter (Minolta) before, during and after paint application using the CIE L*a*b* colour system.
Ageing Tests	Prepared samples were subjected to thermal accelerated ageing (Despatch LEA-169) at 70°C and 50% RH and natural ageing for 28 days. Five samples of each filler were made for every ageing condition to test the fillers' shrinkage and flexibility. Ten samples of each filler for every ageing condition were made to test the fillers' solubility. A total of 80 samples were made. *1.Shrinkage:* dimensions (length, width and height) were measured before and after ageing. *2.Flexibility:* samples were bent around five different objects of varying radii after ageing (Fig.2). *3.Solubility:* samples were immersed in water and acetone for 24 hours after ageing (Fig.3).
Instrumental Analysis	FTIR (Nicolet Avatar 320) was used to analyze the chemical properties of the two fillers in their wet states and in their dry states before and after natural and thermal accelerated ageing.

Results

Painting Tests

Qualitative and quantitative analyses yielded similar results for both fillers after the application of paint. The results varied in the ease of removal:

1.Acrylic paint: was equally difficult to remove from both Flügger® and Polyfilla®.

2.Gouache paint: was more difficult to remove from Polyfilla®.

3.Watercolour paint: was more to difficult to remove from Polyfilla® (Fig.4).

Fig.4: Difference in the ease of removal of watercolour paint from Flügger® (left) and Polyfilla® (right) samples.

Ageing Tests

1. *Shrinkage (Fig.5):* Flügger® experienced greater dimensional changes. Except for the change in height seen in the Polyfilla® samples, both fillers saw greater dimensional changes after natural ageing in ambient conditions.
2. *Flexibility:* Polyfilla® displayed much greater flexibility both after natural and thermally accelerated ageing.
3. *Solubility (Fig.6)*: both fillers were equally soluble in water after natural and thermally accelerated ageing. Polyfilla® was more soluble in acetone.

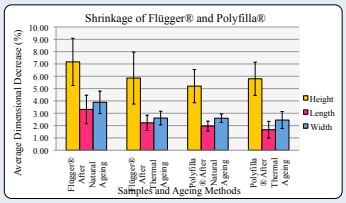

Fig.5: Graphical representation of the average dimensional changes (%) in Flügger® and Polyfilla® samples after natural and thermally accelerated ageing.

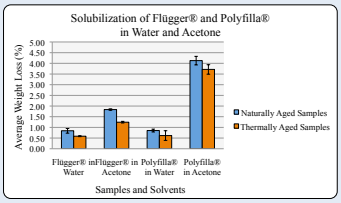

Fig.6: Graphical representation of the average weight loss (%) of Flügger® and Polyfilla® samples in water and acetone after natural and thermally accelerated ageing.

Instrumental Analysis

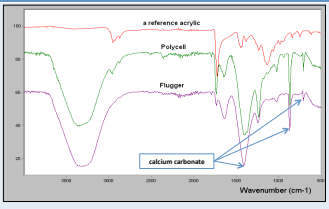

Fig.7: FTIR spectra of Flügger® and Polyfilla® in their wet states in comparison to a reference acrylic.

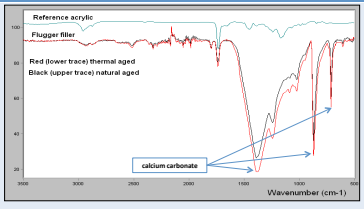

Fig.8: FTIR spectra of Flügger® after natural and thermally accelerated aging in comparison to a reference acrylic.

1. Both fillers were found to be composed of calcium carbonate (peaks near 1400 cm^{-1} and at 870 cm^{-1} and 712 cm^{-1}) and acrylic (Fig.7).
2. Polyfilla® was found to contain more acrylic (Fig.7).
3. Neither Flügger® (Fig.8) nor Polyfilla® underwent any significant changes upon ageing.

Conclusions

In comparison to Polyfilla®, the results have revealed Flügger® to be a poorer substrate for paint, more susceptible to shrinkage, less flexible and less reversible. Based on these accounts, it may be concluded that Flügger® is not a filler of equal quality to Polyfilla®. Further investigations into the fillers' reaction to changes in temperature and relative humidity are recommended.

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