Kicking off with Adhesives: the challenges of treating synthetic sportswear

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Fig.1. Football shirt before treatment

Introduction:

This case study concerns the treatment of three Liverpool football shirts, dating from 1989. The shirts are made of a polyester knitted jersey fabric, with applied lettering and rubberised printed logos across the front of each. The client brief was to stabilise and improve the visual appearance of the lettering, which was deteriorating at a rapid rate.

The *'Candy'* lettering is made of an unknown plastic material, matte and felt-like on the front side, and shiny on the reverse. The lettering was originally heat bonded around the edges to the ground fabric of the shirts. Between the lettering and the jersey sits free floating layers of plastic film and thin synthetic foam, creating a slightly padded look. These layers of plastic film and foam were also in poor condition; the film had become brittle and fragmented, and the foam had a crispy, crumbling texture.

Fig.3. Detail of lettering condition

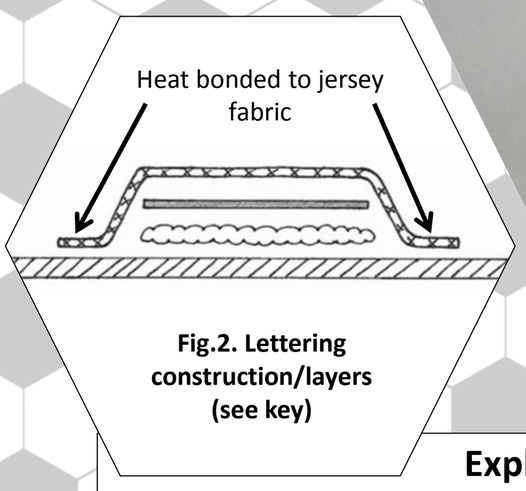

Fig.2. Lettering construction/layers (see key)

Key:

= Jersey ground fabric

= Plastic film layer

= Polythene barrier layer

= Adhesive on silk crepeline

= Foam layer

= Lettering

= Soft weight

Exploring Treatment options:

Stitch repairs through the lettering material as a means of reattachment were not a viable option due to the brittle nature of the material, and adhesives seemed unlikely to be compatible with the stretchy, fluid nature of the jersey. Ultimately, the opposing physical qualities of the lettering and the ground fabric each required its own approach, further complicated by the inner film and foam layers. Overlaying the lettering with a silk crepeline adhesive film was considered, but was felt to be too visually intrusive due to the embossed edging effect of the lettering. Therefore, a combined approach was decided on; adhesive support attached to the underside of the lettering, and stitching to make the bond between the adhesive support and the jersey fabric.

Choosing an adhesive reactivation method was complicated by the materials involved; synthetic materials often have low melting points, and due to the unknown nature of the lettering components, it was decided that using a heat reactivation method would pose too much risk, as well as potentially exacerbating the degradation already occurring within the plastics. Solvent reactivation was considered, but the studio does not currently have appropriate facilities for use of solvents. Water reactivated adhesives Klucel G, Isinglass, and gelatine were tested on plastics materially similar to the lettering, but none of these produced a strong enough bond when reactivated with water.

Other approaches were therefore investigated, drawing inspiration from wet lining techniques commonly used in paper conservation[1]. Gelatine mousse[2] on a silk crepeline substrate was trialled, as a way aid precise application. This produced an appropriate strength of bond, but drastically reduced flexibility. Evacol, an EVA synthetic adhesive, was also tested with a silk crepeline substrate using wet application. This produced good results, with a better flexibility than gelatine. It was found that the Evacol could be lightly applied to silk crepeline and left until tacky, before being adhered in place. This greatly aided easy handling of the adhesive film, and still produced a similar quality of bond as when applied wet. Wicking of moisture was not an issue due to the very hydrophobic nature of the lettering material.

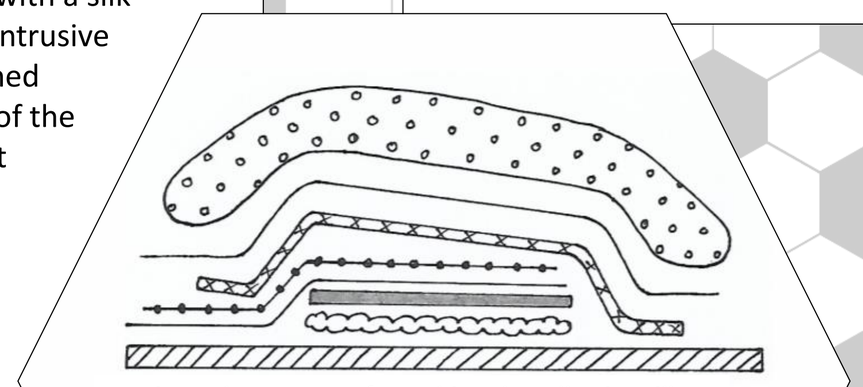

Fig.4. The process of attaching the adhesive silk crepeline to the underside of the lettering (see key)

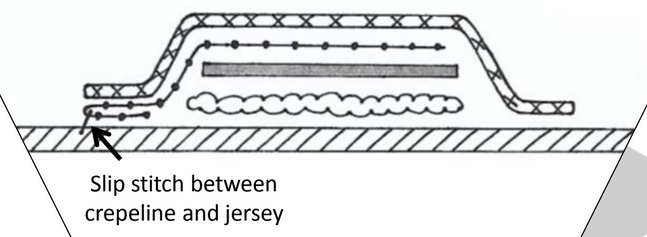

Fig.5. The finished treatment (see key)

Fig.6. Inserting polythene barrier layers

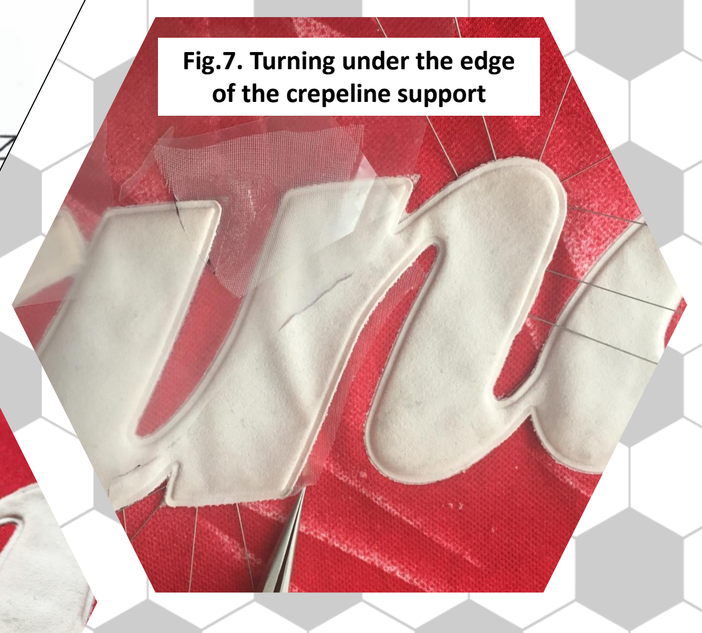

Fig.7. Turning under the edge of the crepeline support

Fig.8. Lettering after treatment

Method:

1. Use polythene sheeting to isolate the un-bonded areas of the lettering from the jersey ground fabric and plastic film/foam layers (Fig.6.).
2. On a separate piece of polythene (cut to size), thinly coat silk crepeline with a 1:2 Evacol:water solution. Leave to dry until slightly tacky.
3. Slide the impregnated crepeline on the polythene underneath the area of un-bonded lettering. Weight lightly and leave to dry.
4. Once the adhesive is dry, remove the polythene barrier layers. Trim away the excess crepeline, leaving an allowance of 5mm protruding around the edge of the lettering.
5. Fold this 5mm allowance back on itself, so that it sits underneath the edge of the lettering (Fig.7.).
6. Using a curved needle and hair silk, slip stitch the folded edge of the crepeline to the jersey ground fabric.

Evaluation:

The treatment was successful in reuniting the lettering and jersey shirt in a visually unintrusive way. The silk crepeline effectively forms a bridge between the two disparate materials; the lettering avoiding points of strain forming by being supported overall by the adhesive support layer, and the jersey retaining the freedom of movement provided by the stitches. It is not known precisely how the Evacol/plastic lettering bond will age - it may weaken and fail over time. However, the silk crepeline has the added advantage of also encasing the inner film and foam layers, guarding against future loss should the adhesive bond fail, and allowing for potential retreatment.

[1]Webber, Pauline. 'The use of Asian paper conservation techniques in Western collections' in *Adapt & Evolve 2015: East Asian Materials and Techniques in Western Conservation. Proceedings from the International Conference of the Icon Book & Paper Group, London 8–10 April 2015* (London, The Institute of Conservation: 2017), 12–27.

[2]Curtis, Antoinette, and Yuki Uchida. *Outlines: Preparation and Application of "Gelatine Mousse" for Archive Repair*. ARA Adhesives and their Applications Training Day, 2013.