

ANALYTICAL SCIENCES

Sample Report / Brittle Paint

Abstract: *Several irregularities were observed with the button coated by the “brittle” paint. Firstly, approximately twice as much hardener is present in the Translucent White basecoat compared to a control. The Black and Ebony coatings also appear to have high hardener levels. This would increase the cure time as the excess hardener would have to react with atmospheric moisture.*

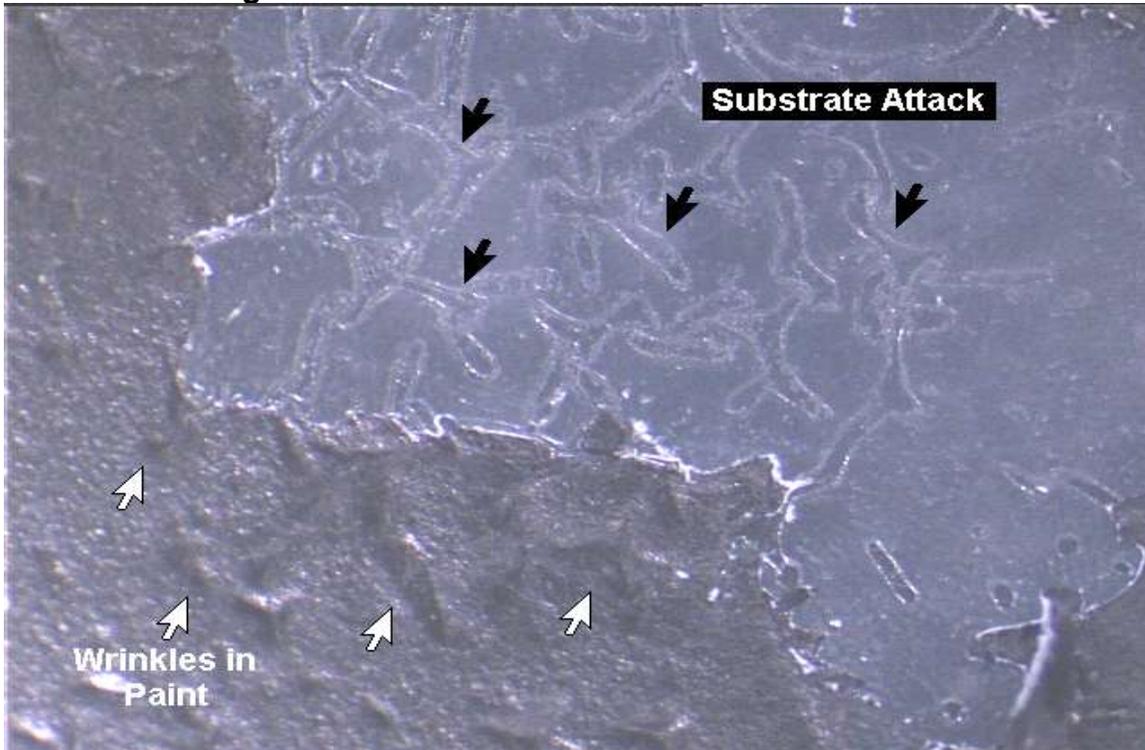
Secondly, the substrate has been attacked by what could be unflashed or inadequately baked out solvent. The marks on the substrate mirror wrinkle marks on the paint.

Finally, the film build of the Translucent White is somewhat low at 0.66 mils.

Purpose and Sample Description: A customer reported brittle paint on coated buttons. A representative button with Trans White Basecoat / Black Midcoat / Ebony Topcoat was submitted to Red Spot Analytical Sciences to determine the cause.

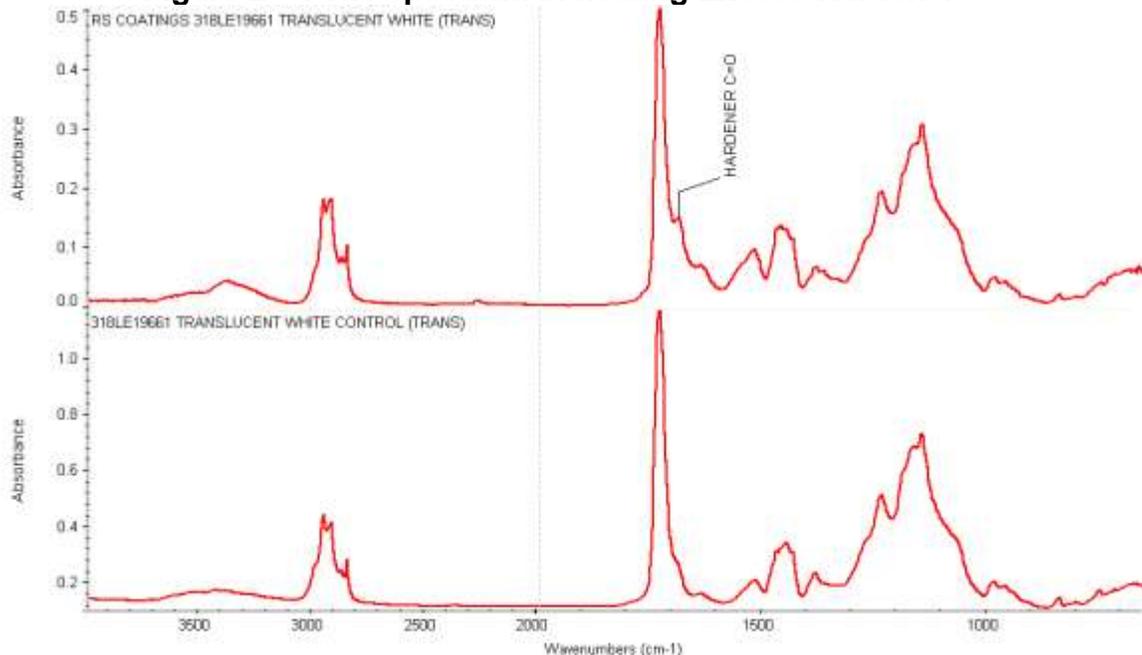
Results and Discussion: Microscopic examination of the button showed signs of substrate attack below the failed paint. Inherent groove patterns coincide with wrinkles seen on the coating. They may have been caused by unflashed solvent from the paint. Figure 1 below illustrates this condition.

Figure 1 – Possible Solvent Attack on Button



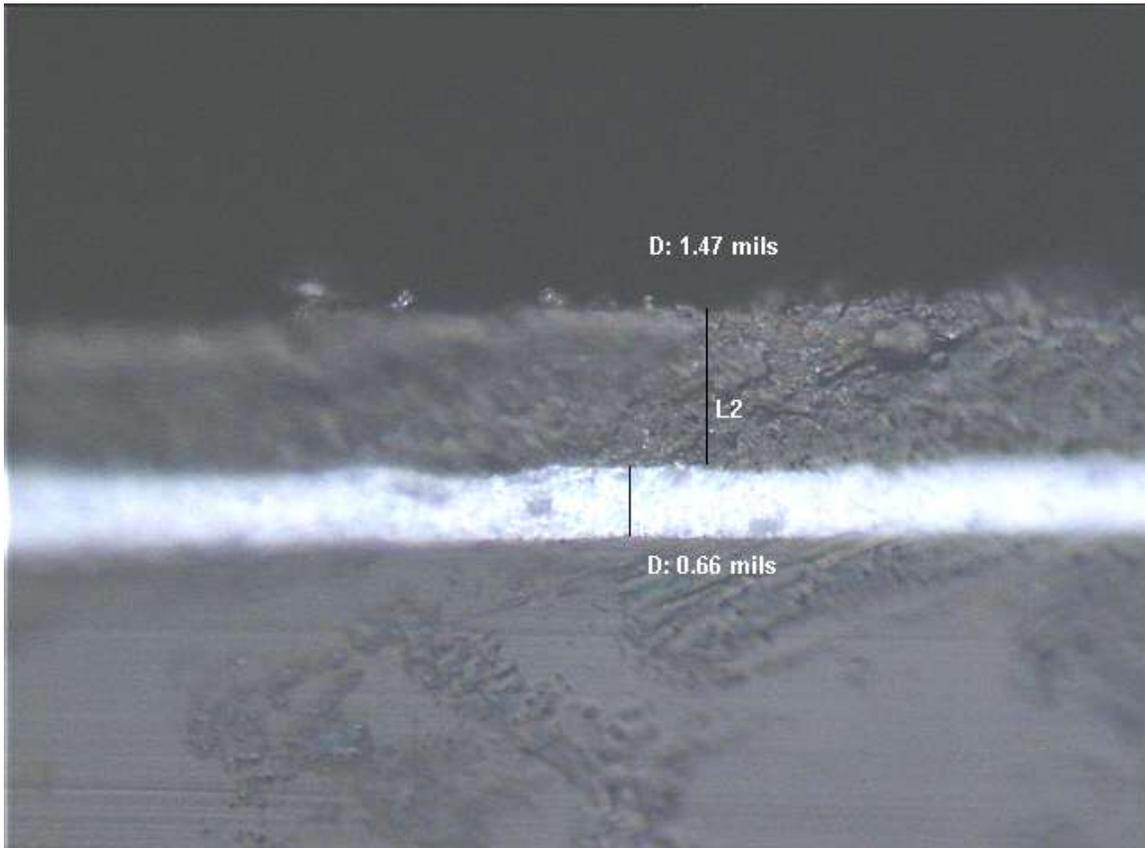
Fourier transform infrared spectroscopic analysis (FTIR) of the Translucent White coating from the button showed approximately twice the level of hardener present, when compared to a control. Figure 2 below shows the two spectra, with the hardener absorption labeled. Its concentration is indicated by the peak height of the carbon/oxygen double bond (C=O) functionality, as indicated on the spectrum. The absorption from the button paint is approximately twice that of the control's. The paint would remain uncured until the hardener eventually reacted with moisture from the atmosphere. The black and ebony also appear to have elevated hardener levels.

Figure 2 – FTIR Spectrum Indicating Excess Hardener



Dry film thicknesses of the button coatings were checked by optical microscopy combined with Pax-It image analysis software. This showed the white somewhat low at 0.66 mils. The DFT's of the individual black and ebony was not determined because of insufficient contrast. Their combined thickness is 1.47 mils as shown in Figure 3 below.

Figure 3 – Coating DFT's of Button from Cross-Section



Chris Stoffleth

Reported by Chris Stoffleth (signature on file)

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