Long-Term Effects of Mounting Digital Ink Jet Prints to Aluminum and Dibond® Supports

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Introduction

The use of rigid supports for the mounting of photographs and digital prints is a common practice by contemporary artists. For both their aesthetic and supportive qualities, aluminum and Dibond® are often popular choices. Dibond® is a composite material consisting of two thin aluminum sheets bound by a polyethylene core. The purpose of this research project was to determine if mounting digital ink jet prints to aluminum or Dibond® can increase the rate of deterioration for the prints over time. Two printing papers were selected, Epson Premium Lustre Photo Paper (a resin coated paper) and Epson Velvet Fine Art Paper (a 100% cotton rag paper). The ink jet images were printed using Epson UltraChrome K3 pigment-based printing ink. The mounted samples underwent thermal aging in a vacuum oven. Reflectance transformation imaging (RTI) and reflectance microscopy were used to image the samples prior to and after aging to examine, very closely, any changes to the surface quality.

Experimental Methods

Sample Preparation

Twenty-four samples were created using a solid grey tone as the image. Twelve samples were prepared using Epson Premium Lustre Photo Paper and the remaining twelve samples were prepared using Epson Velvet Fine Art Paper. Table 1 outlines how the samples were distributed between the substrates and papers used. With the ink jet prints, the aluminum and the Dibond® all cut to 3 x 3 inch squares, the Neschen gudy 870® adhesive tissue was applied to adhere the ink jet prints to their respective supports.

Paper Type	Aluminum	Dibond®	Un-mounted
Epson Premium Lustre Photo Paper	Samples 1-4	Samples 5-8	Samples 9-12
Epson Velvet Fine Art Paper	Samples 13-16	Samples 17-20	Samples 21-24

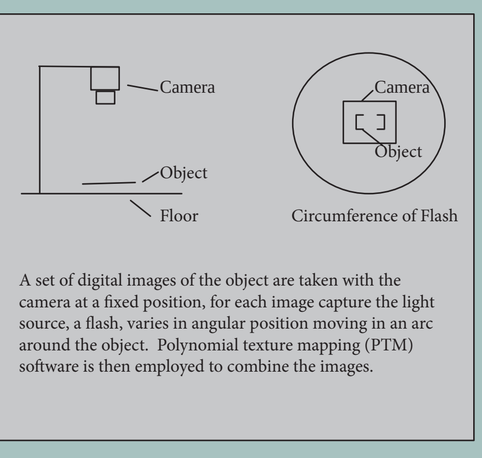
Table 1: Distribution of Mounted and Un-Mounted Samples

Imaging Procedures and Thermal Aging

Figure 1: RTI Captures

Prior to thermal accelerated aging, the samples underwent imaging using RTI and reflectance microscopy to determine the initial surface morphology of the samples; before-aging images can be seen below in Figures 3, 4, 7 and 8. To complete the RTI, a Nikon D300s with a Nikkor Micro 70-180mm zoom lens was used. A Phottix shutter release, a Paul Buff 1600w Alien Bees studio strobe light and a Paul Buff radio frequency flash trigger were also used.

To age the digital ink jet prints, a Fisher vacuum oven was used. The samples were aged for 9.5 days at 85°C ± 3°C to reflect approximately 20 years of aging (Feller and Wilt 1990).



A set of digital images of the object are taken with the camera at a fixed position, for each image capture the light source, a flash, varies in angular position moving in an arc around the object. Polynomial texture mapping (PTM) software is then employed to combine the images.

Figure 2: RTI Schematic

Results and Conclusion

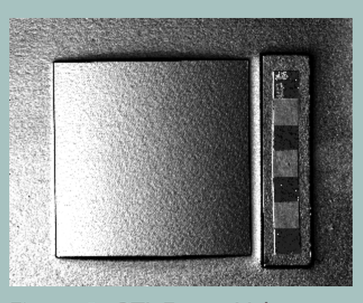


Figure 3: RTI, Epson Velvet Un-Mounted, Before

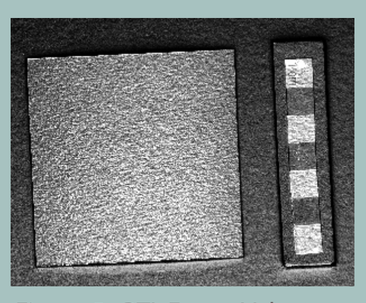


Figure 5: RTI, Epson Velvet Un-Mounted, After

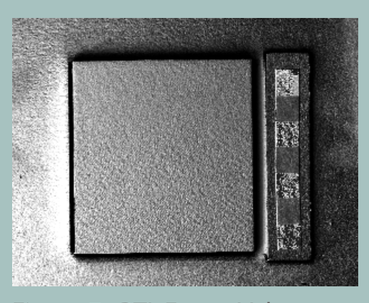


Figure 7: RTI, Epson Velvet, Dibond®, Before

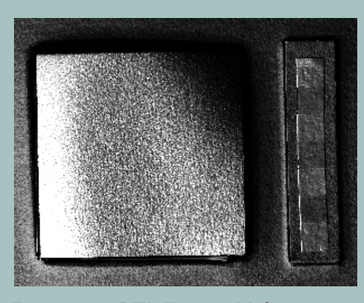


Figure 9: RTI, Epson Velvet Dibond®, After

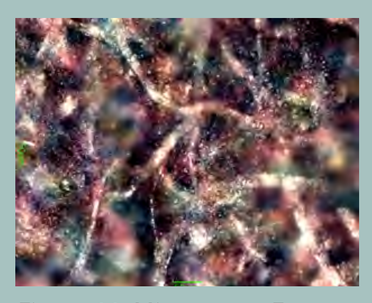


Figure 11: Microscopy, Epson Velvet, 200x, After

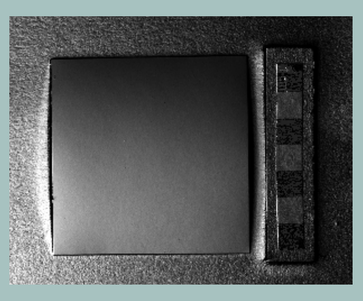


Figure 4: RTI, Epson Lustre Un-Mounted, Before

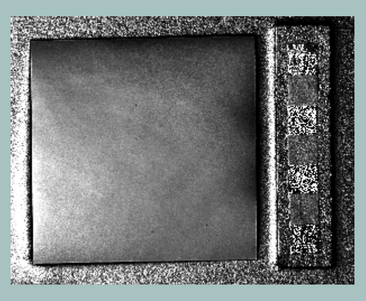


Figure 6: RTI, Epson Lustre Un-Mounted, After

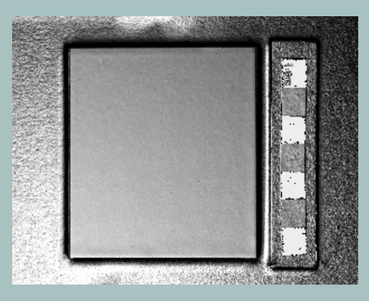


Figure 8: RTI, Epson Lustre Dibond®, Before

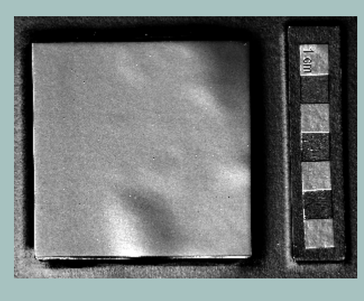


Figure 10: RTI, Epson Lustre Dibond®, After

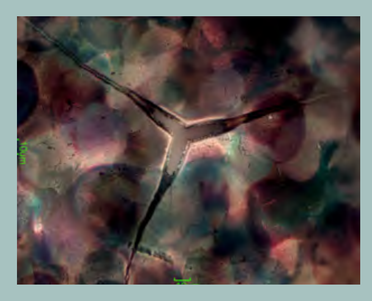


Figure 12: Microscopy, Epson Lustre, 500x, After

- **Greatest amount of distortion and deterioration, in the form of micro-cracks, seen in mounted samples using the Epson Premium Lustre Photo Paper on Dibond® (Figure 12). Micro-crack has penetrated through ink and paper support.**
- **Digital prints that incurred the least amount of deformation and distortion were prepared using the Epson Velvet Fine Art Paper, (Figure 5 and Figure 11). Figure 11 shows paper fibres only, with no visible micro-cracks, mounted on Dibond®.**
- **Epson Velvet Fine Art Paper performed better than Epson Premium Lustre Photo Paper.**
- **Un-mounted and aluminum-mounted samples performed better than Dibond®-mounted samples.**
- **Interaction of multiple components (complex mount and coating on paper) proved to create a less adaptive structure.**
- **Future research could include creating samples of a larger dimension to provide a more accurate representation of large format, mounted, digital ink jet prints, testing different commercial printing papers available with variable inks, adhesive tissues and thicknesses of aluminum and Dibond®.**

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