RTI for RGB: photographing mica based inks on black paper using reflectance Transform Imaging.

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Over the last century printers rely on the combination of halftones and subtractive CMYK ink primaries to translate an image on screen into a colour print on paper. This is certainly commercially expedient for many industrial applications. However, there are emerging novel pigments and processes that work by combining reflection, refraction and interference, and when all the inks are over-layered result in white. So-called red, green and blue pigments are mixed with mica and can be used to create alternative ways of making images that can mimic the appearance of altogether different materials and colours such as beetles, butterflies and artificial colours and lights.

Currently used for decorative effects for packaging and high value products, these are certainly of novelty and alternative to traditional subtractive printing methods. A TC9.18 RGB test chart was printed to explore the limits and gamut of the pigments along side artworks have been made at the CFPR.

Although the inks are pigment based, these demonstrate structural qualities that are also found in beetles and butterflies, and therefore colour appearance is dependent on viewing angle. For example at one angle, colours may appear dull and de-saturated, and at another angle, colours dazzle as a result of interference, refraction and reflection. Again similar to beetles and butterflies, RGB images are difficult to photograph. The problem is that in order to fully appreciate the dynamic qualities of the colour, the paper needs to be tilted or rotated.

Reflectance Transform Imaging (RTI) is a two dimensional photographic method that captures surface texture and colour of a surface to create virtual three-dimensional information. RTI is traditionally used to illuminate 2.5D or low relief surfaces, for example brush strokes on paintings or coins.

In order to capture a surface, the camera and surface are both fixed, and the images are obtained by photographing the surface many times, using illumination points that are fixed at many different known angles. Specialised software processes the images by calculating and stitching all the pixels according to the different lighting angles. The interface enables the user to interactively examine the surface by virtually illuminating the surface of the object from any direction. The RTI images produced are similar to two-dimensional photographs, but reflectance and colour information is contained within every pixel, so when the images are virtually illuminated from different angles reveal micro details of the object’s surface topography as if one was illuminating the real surface.