Test of Inkjet Prints

For

Eastman Kodak Company

EXECUTIVE SUMMARY

With Supporting Charts

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(excerpted from full report available at www.tpr.com)

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Executive Summary

Eastman Kodak Company asked Torrey Pines Research (TPR) to conduct an image stability test on a number of inkjet print samples. Kodak defined the test plan and conditions, and numbered print samples were supplied to TPR already printed. No further information was provided about the prints. The test was therefore a blind test.

Following the completion of the test, Kodak disclosed the identity of the numbered prints by providing a list of the printers, inks and media used to make each print.

The test images were made from ten different commercially available inkjet printers, each using the manufacturer recommended ink set. Each printer was used to print images on the manufacturer recommended media and also on new Kodak inkjet media. In addition, images were printed using the not-yet-released Kodak inkjet printer that has since been launched as the Kodak Easy Share 5000 series.

An image consisting of a number of color patches was used for most of the print samples (Appendix A.). Print samples supplied were exposed to three separate accelerated tests comprising 50 kLux fluorescent light exposure with polycarbonate filtration, 80% humidity with no light, and 1 part per million ozone with no light. At periodic intervals up to 224 days total exposure, TPR measured the colorimetric values of each of 57 color patches on each print sample including the media background. In addition to the color patch image, an image that included bleed patterns and a photo was used for the humidity test (Appendix B).

TPR used two main criteria for assessing the stability performance of the prints using composite colorimetric values. The first of these two values is intended to represent the point where most people would be able to detect a color change in their print. This value is established by a consensus rather than a standard. The second value is intended to represent the point where most people would find the extent of the color change to be unacceptable, and is based on illustrations provided in an ISO standard. TPR then used these criteria to compare the relative stability of the prints. No attempt has been made to project likely life in years. In addition to the colorimetric measurements, TPR used observers to make subjective visual assessments of the second image used in the humidity test.

The results from the light fade test are shown in Figure 1. The relative color fade for each color is depicted in that color and the total color fade is represented by the height of the bar. The left axis shows 4 levels that are judged to be 1 = minimal or no change, 2 = slight change, 3 = noticeable change and 4 = unacceptable change.

None of the print samples in the high humidity test reached the level of color change that would be unacceptable to most observers. Discernable changes were visible when visually examining the prints for intercolor bleed and edge acuity however. These changes were assessed using a similar 1 through 4 grading and the results of this visual assessment are depicted in Figure 2.

The ozone exposure test had the most dramatic effect on the group of samples. Only one print sample, the HP8250, survived the ozone exposure test to 112 days without reaching the point of unacceptable color change. This test was terminated at 112 days for this reason. These results were normalized for a 1 through 4 grading scheme similar to the other result and are shown in Figure 3 below.

At the conclusion of the test all the print samples were returned to Kodak.

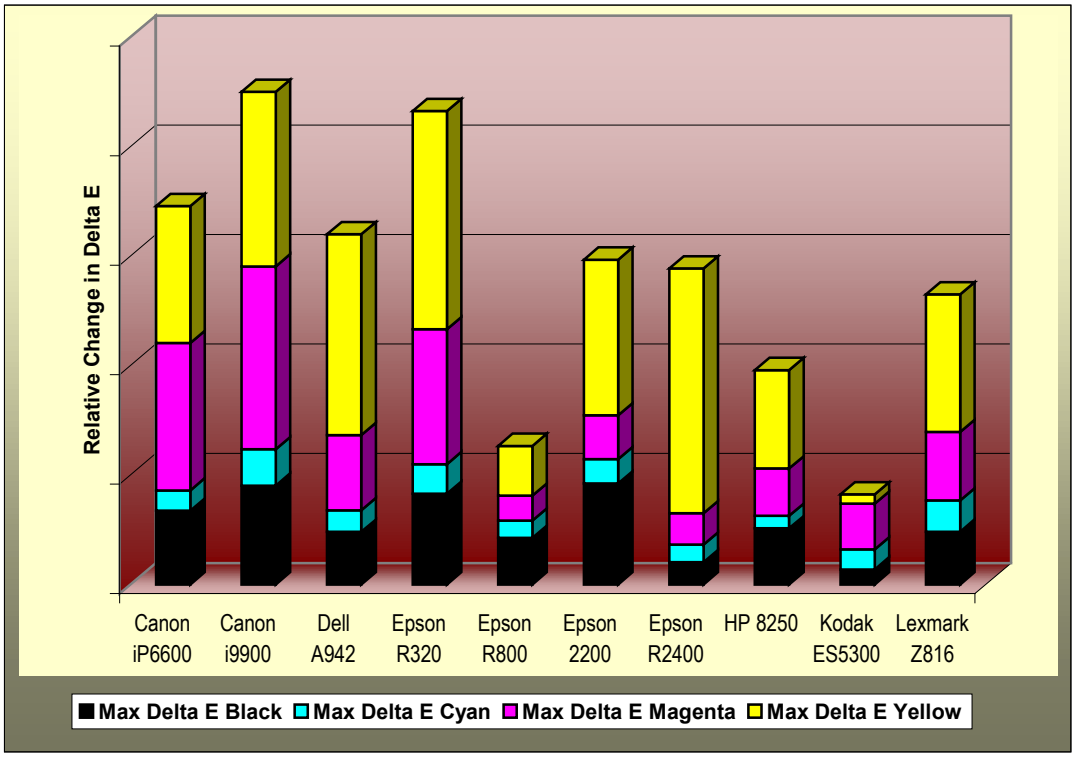

Figure 1 - Summary of 50kLux Light Fade Performance - Lower is Better

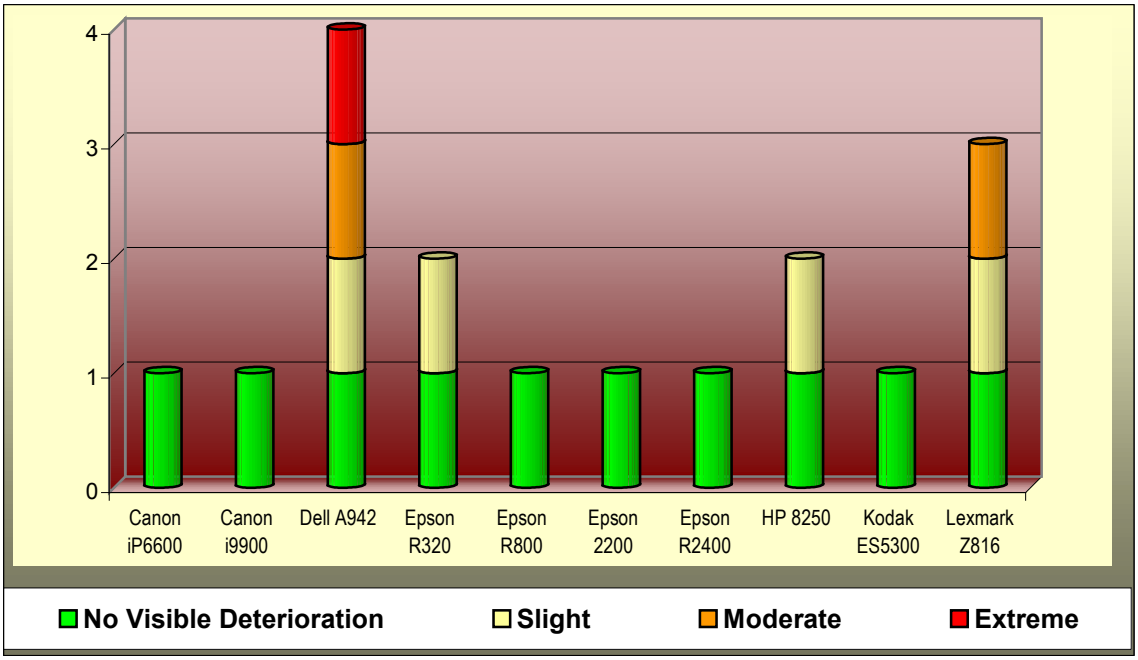

Figure 2 - Summary of Visual Assessment of High Humidity Keeping Test - Lower is Better

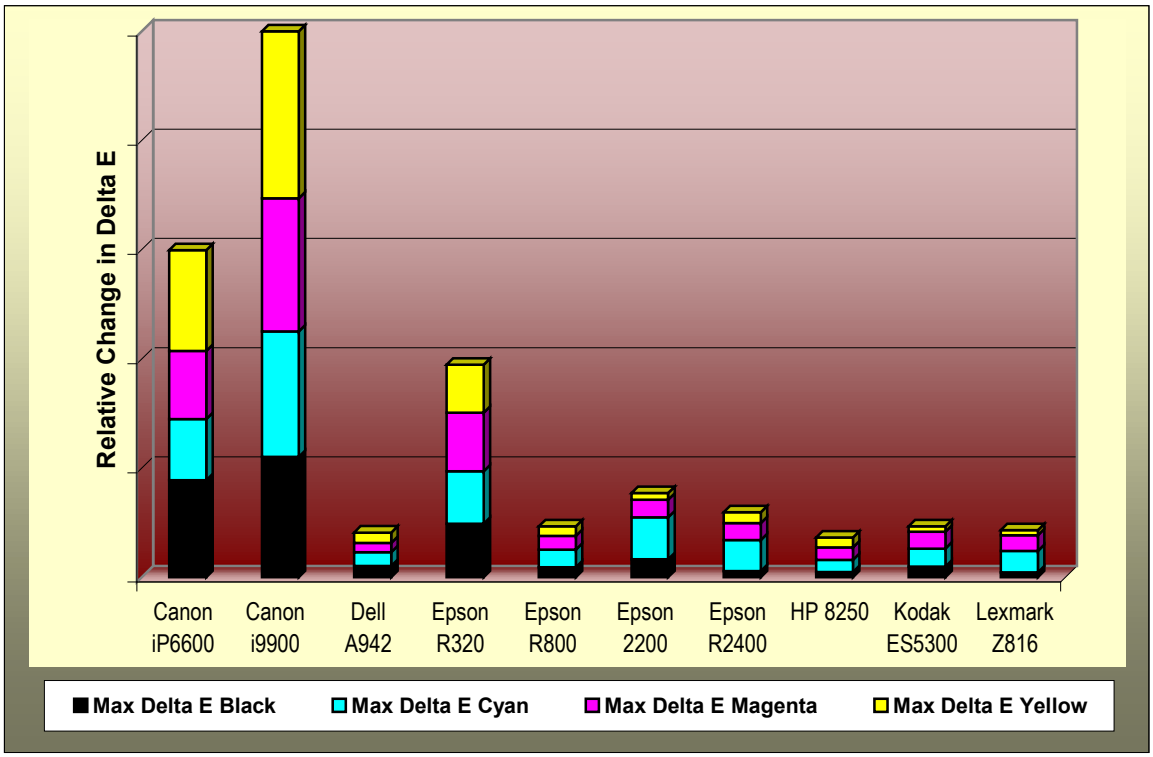

Figure 3 - Summary of All 1ppm Ozone Exposure Performance - Lower is Better

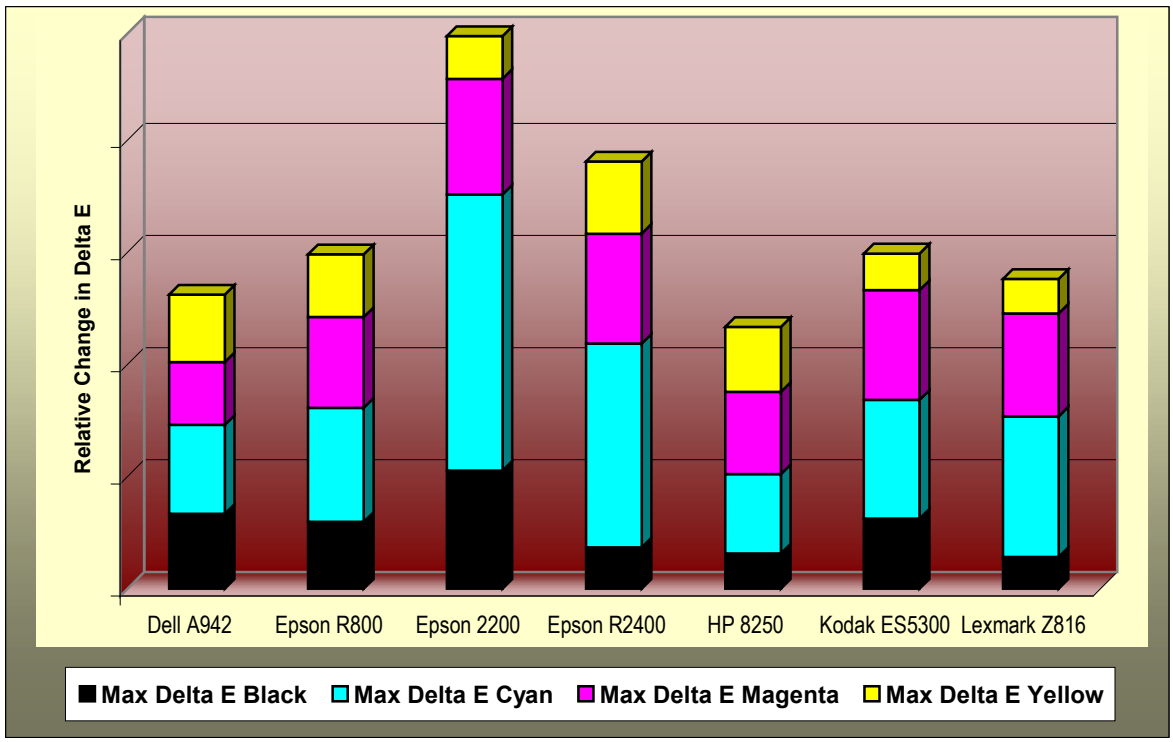

Figure 4 - Summary of Selected 1ppm Ozone Exposure Performance - Lower is Better (Early Failures Removed)

The results of these three tests have been summarized in a single graph inserted below as Figure 5.

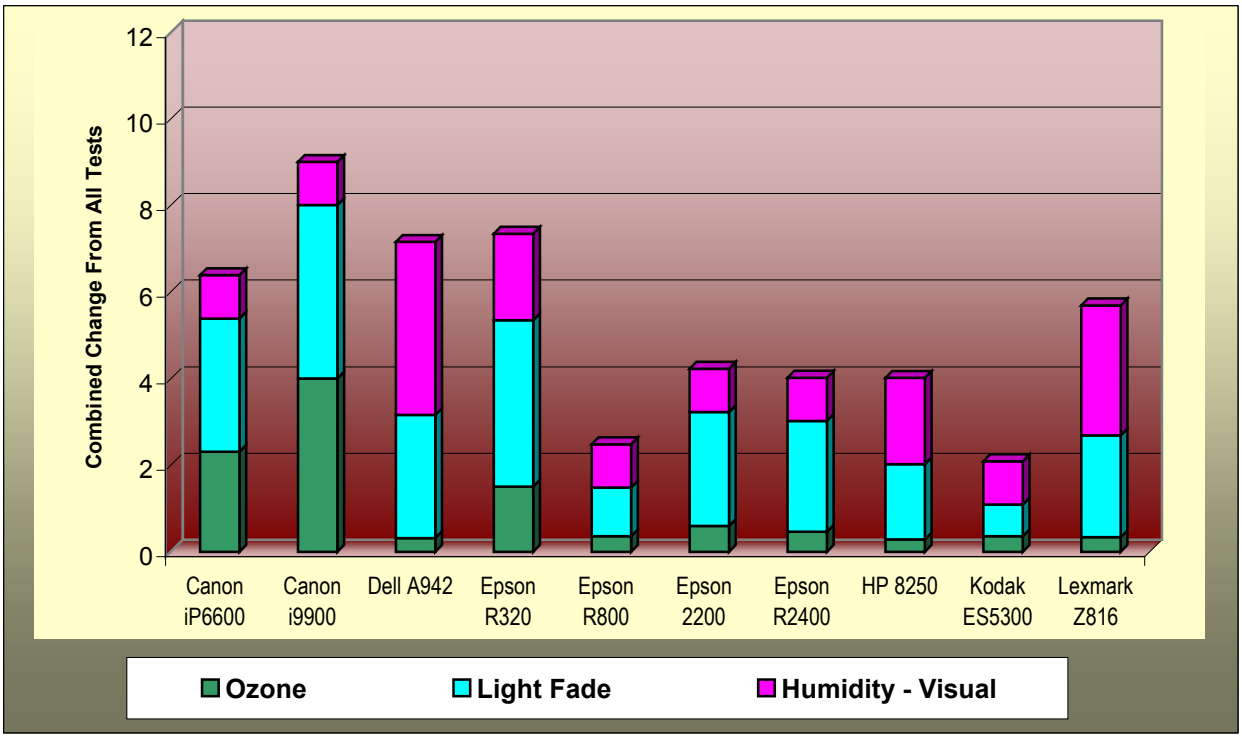

Figure 5 - Summary of Relative Results of all Three Tests

When interpreting these charts it should be remembered that the vertical bars all represent relative not absolute values. The numbers on the vertical axis have no absolute significance.

Overall Summary and Conclusions

Consumers want to know that their images will last without worry or having to provide any kind of special protection. As can be seen from these results, there is a significant variation in performance of the tested inkjet printing systems under the three test conditions that were used. Two of the printing systems tested, the Kodak Easy Share 5300 and the Epson R800 printer provide excellent stability performance in all of the tested conditions. Three more, the HP8250, Epson 2200 and R2400 performed very well under these test conditions. Other systems performed very well in one or more of the tests and were average in the other test or tests.