

**W1.1 Image Quality of Printers**

W1.1 2001 - 059

MicroUniformity

Robert E. Zeman

Nov 30th, 2001

Reference: W1.1 2001 – 056

**Micro Uniformity Ad-hoc Group Meeting, Nov 30th, 2001 1:30PM EST**

(Tele)present: Robert Zeman (Chair, Kodak), Bill Kress(Minolta-QMS), Rene Rasmussen(Xerox)

Rene apologized for his extended absence and mentioned that he expects that circumstances should permit more regular availability from now on.

Although circumstances caused some last minute cancellations of attendance, the three of us decided to discuss what we could and we began with Bill Kress's 12 page draft proposal for analysis of banding/streaking, which he had expanded and mailed to all members on Nov 27<sup>th</sup>. RZ thanked BK for submitting this work, which will help propel the efforts of the committee.

RR commented that in previous notes GC had raised a concern that average  $L^*$  level would have an impact on perception, and there were subsequent remarks that  $L^*$  probably doesn't matter. RR stated that results of his experiments show that average  $L^*$  *does* matter with respect to noise and will need to be accounted for. RR also stated for the record that the size of the image can affect the visibility of banding and could greatly complicate the effort unless we can agree on simplifying procedures. For example, the visibility of certain banding patterns will be different for 5,6,7 and 8mm masks. BK asked how RR would define microuniformity, to which RR responded it would be defined by a certain mask size and viewing distance. We all agreed that this point needs larger group discussion and a choice of both mask size and viewing distance need to be made, barring an alternative approach, by the group.

RZ asked BK about the choice of 10mm for smoothing (see pg. 1) the data. BK said that it was a trial and performance decision and that because it is orthogonal to the artifact being measured, it should have little effect on the results. RZ asked for more explanation of the interpretation of the "crossovers" of the red(HVS) and blue(trend) lines. BK responded that when the difference between the lines is small, visibility is low-to-nonexistent. Higher difference implies greater perceptibility and a series of metrics of this difference could be devised and then regressed against the psychophysical data. BK has recently tried some metrics, some of which seem to work well. He also mentioned that Figures 9 and 19 pointedly show the inadequacy of power spectrum measurements when analyzing non-periodic defects. Other methods are much more sensitive. RR agreed completely with this reasoning, stating also the need for phase information. At this point RZ read GC's suggestion to convert to  $L^*$  before taking the FFT. RR replied that we can't go to  $L^*$  on a pixel-by-pixel basis, since  $L^*$  is a mean level construct. If the image were slightly blurred at the micro level, doing the nonlinear conversion to  $L^*$  would confound the results, especially for noise.

BK stated that while the PK sample sinusoids are essential to get the analysis going, one does not typically observe sinusoids from laser printers, but instead sees more streaks and random artifacts and we will need to ensure our methods address these defects well. We bemoaned the fact that most laser printers are not 'repeatable,' and so generating sample sets of identical random streaks may not be easy.

We agreed to meet again soon to permit those with freer work time over the holidays conversational access.

**Next Teleconference: Tuesday, Dec. 11th, 11:00 EST. Phone number: 1-888-394-5271**

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