Hard, Soft and Remote Proofing

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Abstract

The results from a study concerning digital and remote proofing will be presented in this paper.

Remote proofing i.e. to send a digital file and then subsequently print it on a printer or a copier or to perform it on a screen remote will make a faster communication possible between a prepress company and an advertising agency.

The potential of remote proofing was analysed with aspects of the security of digital file transfer in terms of file formats, transmission technology and colour consistency.

The study is carried out by Framkom in co-operation with ten companies representing the graphic arts industry. Together With Framkom, these companies are linked in a network in which full-scale tests have been carried out. A special test form has been developed for the tests performed in this study.

With regard to colour consistency, calibration issues, and colour management there has been made a comparison between different proofing systems. The reference in the study was a digital printing press. The colour deviation, between proofs and reference, was expressed in ΔE^* for a chosen amount of colour patches.

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The results showed that neither defects detected in the file formats nor visual defects due to the transmission could be found.

In order to obtain a good simulation of the reference print, the ΔE^*-values must not exceed five or at least have a mean value of approximately five. There must not be large deviations in the ΔE^*-values especially not in the process primary colours, affecting all other tones consisting that colour.

The importance of specifications is pointed out.

Background

Remote proofing i.e. to send the digital file and print it on a printer or copier or to perform it on a screen remote will make a faster communication possible between a prepress company and an advertising agency. The definition could also be put "seller - buyer or sender – receiver".

If we look at a scenario where we have a prepress company and an advertising agency, the prepress company will certainly have a high quality proofing unit for contract proof while the agency will probably have a low price proofing unit. The crucial point is that in case of remote proofing these two units, although different, will have to display a document of the same appearance also in regard to colour.

A crucial factor for remote proofing is the property-preserving transmission in all aspects. The transmission mode, the file format and the colour consistency, perhaps the most crucial factor here, are all parameters included in the property preserving transmission.

The totally digitised workflow and the growing demand of a shorter production-time will enforce the use of remote proofing. Added to these facts techniques such as CTP and digital printing will (also) increase the demand for reliable digital proofing systems. This study was initiated both by the demand for analysis and the need for recommendations within this field. The study is still in progress and further results will be presented later this year.

In this study pilot tests were carried out focusing on the basic criteria for remote proofing:

- Security of the document
- Colour consistency of the document
- Relevant file formats
- Relevant transmission technology

With Colour Management Systems and ICC-profiles combined with the calibration and colour matching functions of the proofing systems there seems to be a good possibility of obtaining an adequate colour rendering. At the same time, the transfer between the different units and the different file formats cause distortion of the colour values. Added to this are the various proofing systems, which are based on techniques with foils and toners of differing pigmentation/colour schemes. There is also the soft proofing issue with differing screens and phosphors to take into consideration. All of these components will each have an influence on the colour and despite all available tools, colour consistency can be difficult to obtain.

Apart from Framkom the project group consists of ten different companies representing the graphic arts industry: There is one publishing house, two printing factories, two pre-media houses, three suppliers of proofing units and one company providing transmission solutions. In addition to these companies there is one which develops Rip-solutions that has made a special prototype RIP for one of the proofing units used in this project.

Experimental

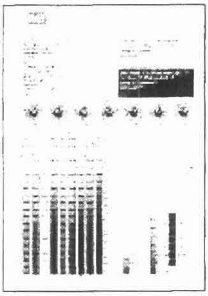
Framkom and some of the participating companies are connected by a network, which makes it possible to send digital files for proofing. Three proofing units are installed at Framkom arranged in a test loop by which tests can be carried out. Since one of the proofing units has been upgraded during the study in fact four units totally could be tested within the institute and one external.

Test form

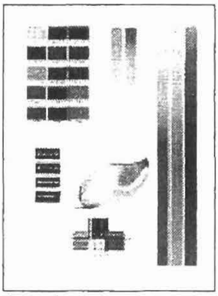
A special test form was created featuring the parameters described in *Table 1*. The test form is seen in *Figure 1*.

Page	Test targets and images
1	Tone scales, 1-5, 10...90, 95-100 CMYK, C+M, C+Y, M+Y, CMY
1	Lines as thin as a hair, 0,06, 0,08, 0,10, 0,12 mm In directions length, across and diagonal
1	Text, negative and positive, 2, 3, 4, 5, 7, 10, 14 and 18 pt
1	Targets for resolution and detail rendering, 0,06, 0,08, 0,10, 0,15, 0,20 and 0,30 mm
1	Grey balance targets
2	Difficult colours, 15 patches
2	Tone scales, sliding scale, CMY, Y-R-M, Y-G-C, C-B-M
2	Swelling
2	Overprint
2	A special Illustrator 8 PostScript 3 image

Table 1. The elements of the test form.



Page 1.



Page 2.

Figure 1. Page 1 and 2 of the test form.

<u>*Transmission tests*</u>

The test form consisting of the pages one and two were sent each with a different transmission mode to three different companies in the project group. The transmission techniques used are seen in *Table 2.*

Transmission used	**General remarks**
FTP(File transfer protocol/HTTP (Hypertext Transfer Protocol, Internet)	Can be sent independent of place or time Compression is determined by the sender
WAM!NET	Guaranteed security, job tickets added
ISDN (Leonardo, Easy Transfer)	Widespread technique, well established

Table 2. Techniques used for transmission tests.

<u>*Tests with file formats*</u>

Both pages of the test form were sent to the receiving companies using two file formats, QuarkXPress 4.0 (compressed with Aladdin Stuffit) and PDF Version 1.3 (Acrobat Distiller 4.0)

To create an output postscript file as independent as possible the Postscript file which was used to generate the PDF file was created from the QuarkXPress document with Adobe PS 8.5.1 and a PPD file for Adobe Acrobat.

The PDF file was created with Adobe Acrobat Distiller 4.0. The settings in Acrobat were made so that the PDF file should be affected as little as possible. This implies for instance that neither text nor images were compressed.

Proofing units and colour tests

The test units in *Table 3* were used for colour rendering tests. A Xeikon digital press was used as the reference unit to be simulated.

Proofing unit Technical data	**Proofer 1 Canon CLC 900**	**Proofer 2 Epson Color Proofer 5000**	**Proofer 3 Agfa Jet Sherpa**	**Proofer 4 Agfa Jet Sherpa 43**	**Proofer 5 Approval PS**
Technique	Electro-Photo-graphic	Inkjet, micropiezo,	Inkjet	Inkjet	Laser generation from foils
Format	A4, A3	A3	A0	A0	A3
Resolution	400x400 dpi	1440x720 dpi	360, 720 dpi	360,720 dpi	1800 dpi
RIP	Prototype EFI Color Wise II	EFI Fiery, RIP-station 5000	Agfa Taipan NT	Agfa Taipan NT	Harlequin
Other specifications		Six ink system with additional light cyan and magenta		Six ink system with additional light cyan and magenta	

Table 3. Proofing units used in the colour rendering tests.

The paper grades used in the tests are seen in *Table 4*.

Papers used for the Xeikon press	**Papers used for the proofing units**
Scandia 2000 Digital, 150 g/m^2	Canon, Color Laser Copier, High Grade
4CC Silk, 150 g/m^2	Epson, Commercial Proofing paper

Table 4. Papers used in the test.

ICC-profiles were created for the Xeikon digital press and the proofing systems with LOGO ProfileMaker 3.0 and test form TC 2.9 consisting of 432 colour test patches.

An IT8.7 target was used to measure the colour rendering and three images, one with skin tones, one high key and one with saturated colours were used for visual comparison. All the images are seen in *Figure 2*.

Figure 2. The three images used in the colour tests.

The intention was to use ΔE^*-values as a comparison value for colour deviation. Earlier (Klaman, Anderson, 1995) developed a test routine for proofing systems and several/various measurements were used to characterise the deviation between a proof and a print. The calculation of the size of gamut and parts of the gamut showed to be a good standard value by which to characterise variation. The intention here however was to use a more simple parameter that could be used as a tolerance level too.

The images were scanned with an Agfa Scan T5000 Plus in RGB and converted to CMYK with the ICC-profiles with the scanner software. The test images were mounted in QuarkXPress 4.05.

CIELAB-values were measured for the IT8.7 target for 23 patches with Gretag SPM 100. These 23 colour patches were chosen representing patches including more or less yellow, cyan and magenta and solid tones of yellow, cyan and magenta as well as red, green and blue. The ICC-target was measured with Gretag Spectroscan under conditions 45/0 geometry, no polarisation, 2° observer, D50 and 380-720 nm measuring interval.

Results of the transmission tests

No visual defects could be found that could be related to transmission. Neither could there be detected any defects due to file format and transmission. The files however will have to be compressed if FTP is to be used.

Results of the tests with file formats

The transmission in itself did not affect the file format, the workflow of the receiver does however, which will determine the choice of file format. PDF is the preferred alternative to open files (not fixed) such as QuarkXPress.

When choosing to deliver PDF files it is however of importance to check the receiving workflow and the possibility receiving and handling them correctly. PDF files can be considered as digital originals and must therefore be created as such. Today there are few or no RIPs able to handle PDF v 1.3 to full extent. As an example, there can be mentioned that Postscript 3 object in the test form was not printed if the file was dropped directly to the RIP via a hot folder. If the file is instead printed out to a printer queue, the object will be printed correctly since the information in the document will be interpreted to belong to a lower Postscript level possible for the RIP to handle.

Results of the colour tests

In *Figure 3* the ΔE^* for the 23 colour patches for one of the papers and two of the proofers are plotted in a diagram. For proofer 1 the deviation level compared with the reference is about $5\Delta E^*$ units and for proofer 2 higher. For proofer 2 the highest values are found for yellow and yellow tones which are also reflected in the image with skin tones that have a slightly yellow colour cast. The image from proofer 1 is similar to the reference but slightly lighter and does not have the slight reddish cast that the reference has.

The largest ΔE^*-values are found for Proofer 2 for solid yellow and all the yellow tones. To analyse why the deviation exactly occurred the a^* and b^*-values are plotted separately in *Figure 4* and *5*. The largest contribution to the deviation compared with the reference came from the a^* values, the red-green components.

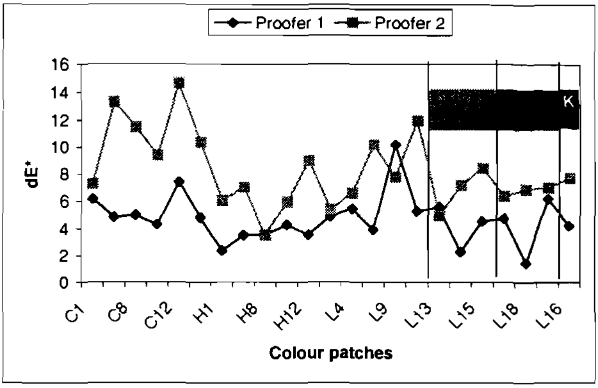


Figure 3. ΔE-values for the 23 colour patches for the paper S 2000. C represents yellowish tones, H cyan based and L magenta based tones.*

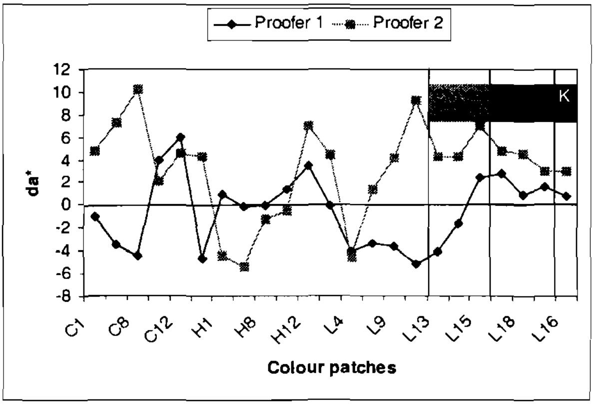


Figure 4. Δa-values for the 23 colour patches for the paper S 2000. C represents yellowish tones, H cyan based and L magenta based tones.*

Visual judgements gave the result that it seems to be possible to obtain a good simulation of the reference print if the ΔE^*-values do not exceed 5 or at least have a mean value for the colour patches of approximately 5. Also there must not be large deviations in the ΔE^*-values in the process primary colours, affecting all other tones consisting that colour. Deviations in L^* are more acceptable than deviations in a^* or b^*.

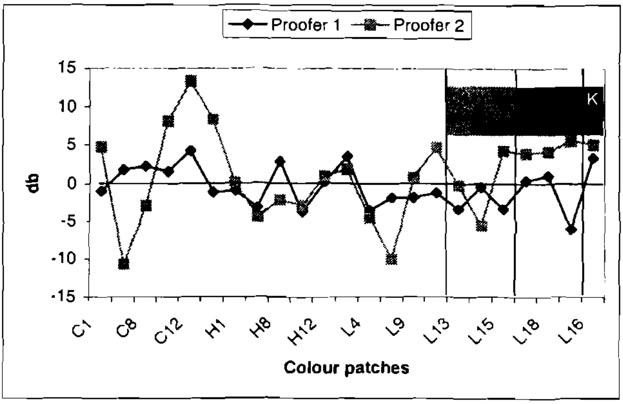


Figure 5. The Δb-values for the 23 colour patches for the paper S 2000. C represents yellowish tones, H cyan based and L magenta based tones.*

In *Figure 6* the ΔE*-values for all the five proofers are plotted. Comparing the measured figures and the appearance of the images it could be concluded that ΔE*-values of approximately five and lower are acceptable for contract proofs, higher figures for proofs with lower demands of colour consistency. Preliminary values between 5 and 8 could be acceptable for "standard" proofs and values >8 lay-out proofs only.

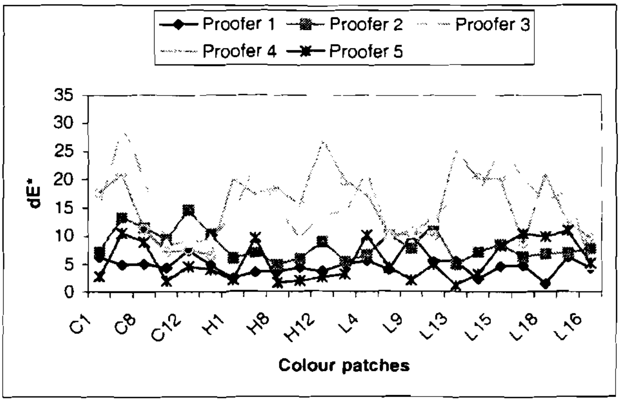


Figure 6. The ΔE-values for all the five proofers and paper S 2000. C represents yellowish tones, H cyan based and L magenta based tones.*

Conclusions

Criteria for a functioning remote proofing concept are the establishment of both a good communication between the sender and receiver and of well functioning routines and specifications.

Use of ICC-profiles to obtain a good colour matching is demanded but may not always suffice. Work will be continued in this field.

Using colour management implies a stable process.

The choice of an appropriate paper for the proofing unit is also important if to obtain a good colour rendering.

There is a problem to decide what tolerance level is accepted since the proofs many times show good agreement in some colours but may differ in others. Different techniques also deviate in varying modes.

Preliminary tests with soft proofing have also been done within the study presented here. Important criteria for soft proofing are the quality of the screen, the calibration and the characterisation not to forget the environmental factors (colours and lighting).

The results show that there is a good potential for soft proofing but the study is not yet concluded.

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