

Double Image Design in Newspaper Production

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Abstract:

In the high circulation production of daily newspapers, a double image, double information is set under the rules of Infraredesign theory (Pap et al, 2010). The management of visible and near infrared is posted with process colors for color setting configured for conventional newspaper print. The place of imprint that has delimited information in vs (Visible Spectrum) and NIR (Near InfraRed) is called “a print with an infrared effect,” or conditionally “a print with infrared colors.” Daily newspapers, as massive carriers of information made by printing technique, are receiving a new form of presentation: printed image with a built-in invisible image.

Keywords:

Infraredesign, Newspaper Production

1. Introduction

Infraredesign uses properties of dyes which occur with programmed mixing in the range of 400-1000 nm. Fortunately, our eyes detect only the first half of the wavelengths, while for the other we use an instrument. Art is familiar with the technology of video, film and television, which enables visualization through instruments. Infrared camera is also an instrument that shows the image produced from the NIR wavelength. Since we do not see the NIR wavelength, an image is programmed that has colors pressed simultaneously with the colors visible in the vs (Žiljak, V. et al, 2009a). Double feature of printing inks allows the creation of an invisible

picture, selective image display, one directly for our eyes, and the other, the invisible one, can be recorded with the ZRGB apparatus. The ZRGB apparatus can simultaneously record the response in the NIR as Z recording, and the vs response as RGB recording. First applications were created for digital print due to innumerable experiments in the secured program (Žiljak et al, 2010). Subsequent experiments followed in other media: textile (Žiljak, I. et al, 2009) and leather. The development of the application was based on different printing technologies as well as the introduction of the effect via spot colors in offset printing. After producing unique designs with in which digital printing dominated, tests followed which included the colors for newspapers as one of the most important experimental plans.

2. Performance of z Recording With the Process Colors in the Newspapers

Printing experiments are simulated in several different color setting for the newspaper. Previous experiments with “JapanNewspaper” color setting (Pap et al, 2010) were used as parallel verification of calculated color setting according to the tests of coverage for a real newspaper in the printing house “Vjesnik”. On August 8th 2010 the first completely hidden information was published in the newspaper “Vjesnik”, which used colors in printing with the label „SunChemical Vistachrom M“. Their color setting profile was „150newspaper26v2“, which represented the basis for a successful implementation of two independent stages of reproduction, the two independent images. On the last 32nd page of the newspaper “VJESNIK, FOTOSOFT INFRARE-DESIGN”, information was inserted into a photo

with an article titled “Stolen jewelry and watches worth half a million”. This information is detected as a dark gray tone, but only in the NIR light (Figure 1). The whole news photo is made with only cmyk colors prepared by the rules of CMYKIR separation (Žiljak et al, 2010).

As opposed to the first experiment, that same experiment was performed with opposite order and press release of the newspaper was launched on August 19th that same year. Colors for the z are set to the maximum z_{max} conventional CTP (Computer To Plate) separation, i.e. with the planned maximum infrared response. Text “ZAGREB / IRD” is seen as white areas in the vicinity of the image that shows little kittens (Figure 2). That part of the graphic is separated with z_0 values respectively without the presence of infrared response. Negative implemented information is geared towards the desire to use cmyk colors so that in the infrared part of the spectrum only the information of color paper can be seen.

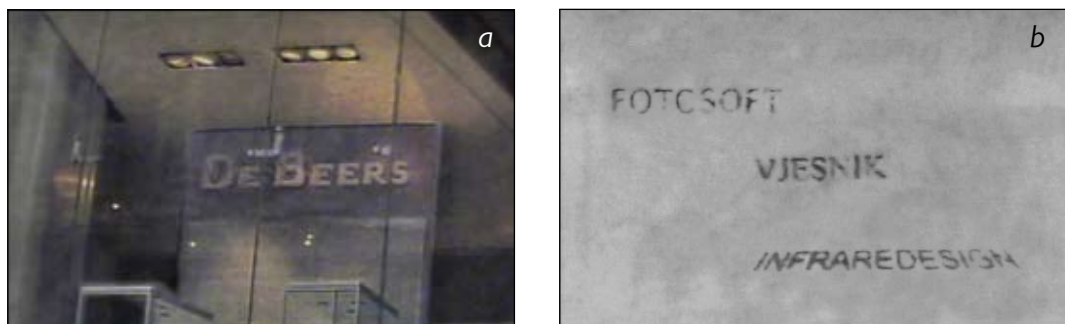


Figure 1. vs view (a) and NIR view under 1000 nm (b) of the dual image design printed in the newspaper “Vjesnik” on August 8th, 2010

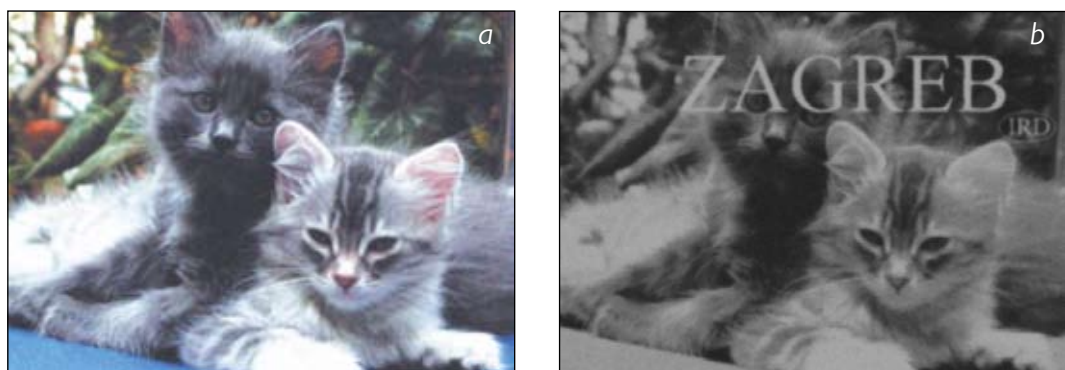


Figure 2. vs view (a) and NIR view under 1000 nm (b) of the dual image design printed in the newspaper “Vjesnik” on August 19, 2010

The third experiment is printed in the newspaper “Vjesnik” on 20. August as positive steganographic information (Figure 3). The image of the bear turns into a white bear in the infrared spectrum and ZAGREB IRD is written over his back in the dark tone of the maximum absorption of NIR light.



Figure 3. vs view (a) and NIR views under 630 nm (b) and 1000 nm (c) of the dual image design printed in the newspaper “Vjesnik” on August 20, 2010

The fourth experiment (“Vjesnik” 8/21) was carried out in terms of the second experiment. The surrounding of the front of the houses throws out complete NIR reflection of letters “GRF and the TVZ” (Figure 4). Experiments were conducted for all editions of “Vjesnik”. The task of the image for IRD (InfraReDesign) is given at 1PM the day before publication of daily newspapers. CTP plate making procedure started out early in the afternoon so that in the early evening hours the first edition of newspapers could be found on newsstands. This is mentioned in order to accept a discussion on the efficient implementation using CMYKIR program for the separation of the parameters of

linear mathematical models that are calculated for a long time.



Figure 4. vs (a) and NIR exhibition (b, c) of the dual image design printed in the newspaper “Vjesnik” on August 21, 2010

3. Newspaper Colorsetting

Conventional analyzing of replacing colors provides a cascade selection from zero setting to a maximum replacement of black color with CMY dyes with constant maintenance of visual RGB, Lab and HSB values. INFRAREDESIGN with CMYKIR separation implies a continuous exchange with regard to the application of mutual relations between the two incoming images (Žiljak et al, 2009b). Typical replacement of colors for the newspaper is a sharp drop in CMY, which is described by the coefficients of exchange with values greater than -1. Properties of inks for the newspapers show that the aim is to replace black as soon as possible with CMY processing components. Let us compare this decline in the example of the brown tone for Vjesnik color settings, JapanNewsPaper color settings and Euro uncoated v2 color settings (Table 1).

Table 1. Color replacement table for the given brown color RGB: 130, 90, 80; Lab 44,23,16; HSB 11,39,51

	Vjesnik color setting		Japan NP colorsetting		Euro uncoated v2 colorsetting	
	cmk	Downfall ratio	cmk	Downfall ratio	cmk	Downfall ratio
$\kappa=0; (X_0)$	47,74,90,0		49,95,100,0		51,73,83,0	
		$X_0/X_{1/2}$		$X_0/X_{1/2}$		$X_0/X_{1/2}$
$\kappa=1/2_{max}; (X_{1/2})$	27,57,56,23	-0.869	27,67,68,22	-1.	31,63,67,22	-0.909
		-0.739		-1,318		-0.454
		-1.478		-1.455		-0.727
	X_0/X_{max}		X_0/X_{max}		X_0/X_{max}	
$\kappa=max; (X_{max})$	0,39,29,47	-1	0,43,36,43	-1.139	0,51,49,44	-1.159
		-0.745		-1.372		-0.500
		-1.298		-1.488		-0.773

Continuous replacement values for the same tone and for Vjesnik's printing colors are shown on the chart (Figure 5) where the values of a certain state of processing colors are given as a vector:

$$X_{max} = \begin{pmatrix} C_{max} \\ M_{max} \\ Y_{max} \\ K_{max} \end{pmatrix}; X_k = \begin{pmatrix} C_k \\ M_k \\ Y_k \\ K_k \end{pmatrix}; \text{ for all states from } X_0 \text{ to } X_{max}$$

κ_{max} size has a significant place in the CMY-KIR separation. This also determines the maximum value of z; absorption of near infrared light. The position of x_{max} allows the calculation of small values of z, continuously from $\kappa=0$ to κ_{max} calculating corresponding to the value of x. x_k is the given value of visibility in the NIR wavelengths.

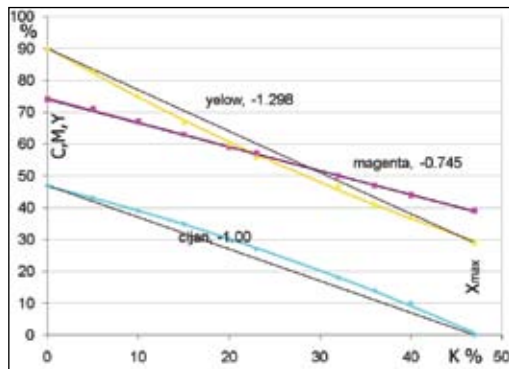


Figure 5. Graph of c, m, y reduction for the increase of κ while keeping the RGB values

4. Whole Spectrum of Vjesnik's Colors of Transformation From x_0 Into x_{max}

Experiments with steganographic pictures in the newspaper press were carried out for a picture that uses the entire spectrum. A chart in Figure 5 shows only one color tone. Calculation for all tones is based on measure equaling of 126 charts that gave a general correlation of connection between the x_0 and x_{max} . Regression analysis was applied to 6 independent variables, where x_{max} depends only on x_0 sizes, that is, only on the C_0 , M_0 and Y_0 . Three independent variables are the corresponding size of the x_0 , and the other three variables were created in different experiments of the differently proposed regression models as shown in the vector N:

$$N = \begin{pmatrix} C_0 * M_0 * Y_0 \\ C_0 * M_0 * M_0 \\ C_0 * C_0 * Y_0 \\ Y_0 \\ M_0 \\ C_0 \\ 1 \end{pmatrix}$$

Full range of Vjesnik's translations continuously from x_0 to x_{max} for all conditions is described as a product:

$$X_{max} = Q * N;$$

with the values of the Q matrix:

$$Q = \begin{pmatrix} -0,06205 & 0,004115 & 0,01329 & 0,23147 & 0,29001 & 1,27377 & -33,67 \\ -0,05188 & 0,007770 & 0,005694 & 0,20603 & 1,41407 & -0,11554 & -20,59 \\ -0,05241 & -0,01057 & 0,003434 & 1,48874 & 0,53068 & 0,31626 & -38,67 \\ 0,05572 & -0,00421 & -0,01109 & -0,20722 & -0,25063 & 0,09109 & 25,94 \end{pmatrix}$$

obtained with multipole linear regression. A linear model of CMYKIR separation was made for newspaper printing by means of these values. The results were verified in recent experiments of mass printing in “Vjesnik” from August 18th to August 30th, 2010.

5. Experimental Framework of Newspaper Printing Technology for IRD

the most important starting point for describing the conditions within the technological process under which this experiment was carried out originates from a desire to make printing completely identical to daily routine, a conventional production of daily newspapers. Therefore, deviation from daily routine or special adaptation is not allowed.

It is precisely under such conditions that this experiment was conducted and all the present results gathered. It was not a part of any print test. Analyzed samples are a part of conventional newspaper editions that entered a process of distribution as well as selling. This means that it is possible to repeat the same experiment and obtain identical results with a copy of any newspaper from any point of sale in the days of the experiment. As evidence we can provide the possibility of identical experiments, even today - with the same newspapers that were unsold and ended up as production surplus in distributor’s warehouse. That provides a basic but also the highest value of this experiment.

6. Technological Conditions of IRD Experiment

Since a printed newspaper is in tabloid format from the field of Nordish cluster classifications of the newspaper format (29 x 42 cm), this implies a total tower capacity of 32 tabloid pages, which is also the total volume of the newspapers used for the experiment. Since pages of the tabloid newspapers are in a lying position on such a machine construction, images on which the experiment is done are in the lie-down position, i.e., they lie in relation to the direction of printing.

A page produced in PDF is rasterized using the calibration curve in the PRINERGY EVO RIP, after which it is automatically positioned according to the named convention in the News-Way workflow system to its place in predefined assembly. Kodak Staccato FM raster size of 40 micron was used for the rasterization. The medium used is a negative, digital, thermal plate Kodak DITP Gold.

Printing machine used for reproducing is manufactured by MAN Roland Druckmaschinen AG, Geoman. It is a machine with a capacity of 4:2 to a total capacity of broadsheet newspaper pages. The experiment was done on Vipap SOF paper with grammage 45 g/m2.

7. Discussion and Application

A necessary precondition for the elaboration of possible IRD graphics application in the cold-set newspaper printing technology was achieved and stated. It is therefore possible to manage the implementation of IRD graphics in daily newspaper production under the terms of actual and daily production routines.

This means that this application gives us the possibility to be creative and its implementation offers us a real benefit. Although this is an area that will certainly arouse interest and result in experimental research in the nearest future

(current authors are already experimentally developing proposals for real application), at present moment it is already possible to indicate the directions of use.

Besides the already well known features of security printing elements, it is to believe that the creative use of graphics IR in the newspaper production can be expected in the other implementation - and that is double information on the same image, under identical printing conditions, in the identical printing process, and - most importantly - at no extra cost.

Special emphasis in the research of steganographic procedures in newspaper production will be put on systematic coding and on the system of bibliographic tagging and archival elements. It is known that news production involves multiple editions of the same newspapers, which generates a need for the necessary mutation of pages and the necessary change in carriers of the printing plate, i.e. plate for printing. This allows us to implement eye-hidden marks for the introduction of a system of internal coding for multiplatform use. In practice, this can include daily (or occasionally or as necessary) implanting of IR graphic elements in fixed graphics elements of daily newspapers (implementation in page borders, sections titles, issue numbers or regions to which a particular issue relates) and in similar mode of application. This gives us a possibility of systematic control of sale and newspaper distribution, presentation and positioning of real production surplus, the exact control of the daily newspaper traffic, and other applications from the above mentioned. It is significant that it would only be creator known elements and it would not be possible to use all mentioned incorrectly.

As far as the system of bibliographic tagging and archival elements is concerned, it is well known that neither archives nor newspaper editorials are logically organized. This concerns primarily search by keywords and the overall organization of information. Time will surely show the creative possibilities of implementing IR graphics in this segment of newspaper production. However, it is already necessary to

indicate the possibility of implementing IR elements in the newspapers by the principles of systematic archival and bibliographic tagging. With the possible duplicate information (depending on the real need) this may understand the installation of keywords in images that are pressed, installation of additional labels on the title of the daily press in place where the number of publications and the release date is located, as well as other possible modes of application.

A key conclusion is that the experiment in this paper allows such technical and technological capabilities. It is therefore possible to achieve an imprint with hidden image, double-bearers of information in a quite conventional and in no way altered setting of daily production in all its stages (except in the phase of changing color system and manipulation within channels of each color)

The basic technical-technological starting point is already present. The very areas of application are certainly numerous and multileveled so this paper could only outline some possible applications and areas for further experiments of the current team in some future researches.

8. Conclusion

Newspapers have always been an imperative to the development of graphic technology. As holders of information they integrate daily news, columns, ads, even lottery games. All these sections may find possible application in the creation of duplicate information, hidden images or double images. The editors are offered a space to create invisible and yet visible information by means of a ZRGB apparatus. Such hidden message is a new way to communicate using a printing method. IRD method in newspaper production has been successful on several levels: the integration of the two images, the integration of text and images, the integration of graphics created as the algorithm of an abstract form in vs with a text message in the NIR. Properties of color range for the newspaper printing can be

described as an analog linear system of dependence of the maximum infrared effect on the zero state of the conventional separation. This has created a mathematical model of combining the two images, each detected in a given wavelength space: VS and NIR.

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