Investigation of the Differences Between Conventional, Thermal and Violet Plates by Test Prints

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Abstract

The rapid development in the electronic-computer technology has caused to rapid increasing software and hardware production in the printing sector. The CtP, a plate preparation technique without using a film is one of the most important developments for the last decade. Using this technique is important since CtP minimises the duration passing from the pre-printing operation to final printing process and it also lovers printing costs. However, CtP users have not yet solved the application problems related to exposure equipments produced by different companies and their working principles are not clearly understood. There ara also some lack of technical knowledge. In addition, one of the issue in question is which plate product would give the high quality printing. The main purpose of the present study is to investigate the differences between plates by using test prints.

In this study, first a test print original was prepared for the use of in the printing step, consisted of CMYK color. On this original, there are an UGRA 82 printing control scala, a plate control strip and also a scala which has a tram dot density of 1-100 % in CMYK colors.

The prepared original was exposed into conventional plate, thermal and violet plates with development. A print into 170 g/m^2 gloss paper was in the same

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physical conditions using Heidelberg Speedmaster. The dot gain, density and trapping values were again measured during the printing, just after the printing and 1 hour and 24 hour after the printing. At the end of these measurements, the data obtained were evaluated.

1. CtP Exposure Techniques

CtP equipments were based on FD Oil, Aryon Ion and Helium Neon laser Technologies by 1998. The common key difference between the types of CtP exposure equipments and the plates is the application technique of the energy which provides the exposure to the plate. This could be either heat or light. The light can be classified into two categories ie. Visible and ultraviolet light. The laser diyotes which were used in the plate exposer have wavelengths represented in Figure 1. They are unexpensive, reliable and have a long life.

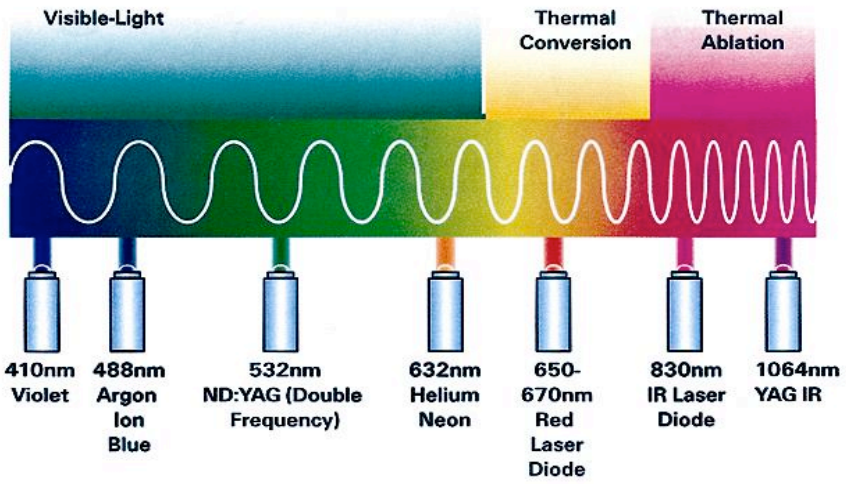


Figure 1- The order of wavelengths of thermal, violet and infrared light.

Laser is used in violet CtP equipments and a 400-410 nm light is used for exposuring plates. In thermal CtP's a 830-1064 nm light is used. Each type has advantages and disadvantages related to the obtainability as a commercial product, quality of image, exposure rate, handling and time requirements. The increase in the laser number causes an increase in the exposure rate. That is to say, it increases the amount of plate taken per hour.

1.1. Violet Exposure

This technology uses the same technology as the classical internal film output equipments. The exposure is achieved by using a laser source, an optical equipment and a spinner motor. In this system, while the plate is kept fixed, the optical equipment is in movement. The violet exposure technology consists of

light sensitive plates at the wavelength range of 400 to 410 nm. The lower wavelength of violet laser allows to use faster spinner motors. Since very low power is enough to run violet exposure, only one laser gun is used. Recently, there are also violet exposures with two laser guns.

As in the conventional system, the developer is also of a great importance in CtP system. The exposured dot in the film becomes smaller in the case of hard development while it becomes wider in soft development. This rules are also valid in CtP plates. The printing quality of violet CtP is directly related to the development.

1.2. Thermal Exposure

The external technology is used in most of these CtP's. The laser ray from the optical equipment is directly comes into the plate. The distance between the exposure head and the plate is very short. This situation prevents the deformation of geometrical structure of the laser ray. In this system, the plate is mobile and the optical equipment is stationary. In thermal CtP's, the heat from laser bar is used to start a change in the plate. The image quality is better than violet technology because it has a certainly defined starting temparature. The exposure does not start until the plate reaches the desired temparature. In the thermal exposure, a very clean and sharp ended dot is obtained.

In the thermal viewing, the greatest risk is the sensitivity of the plate. In order to make exposure on these plates, it is necessary to have an energy of 1000 times greater than violet plates. Therefore, it is essential to use stronger lasers in the thermal exposurer.

While dots of 2 and 98 % are taken in the violet plates, the dot sensitivity of 1 and 99 % can be catched in the thermal plate. In thermal systems there are also development bath. The temparature and duration of the development are also important. However, in thermal plates, since the heat formed on the plates, the plate is affected by development in a certain extent. After this limit, the excess energy does not harmful to the dot. Recently, there are processless plates of thermal CtP's. The simple faults originated from development chemicals and plate operators are eliminated with these plates.

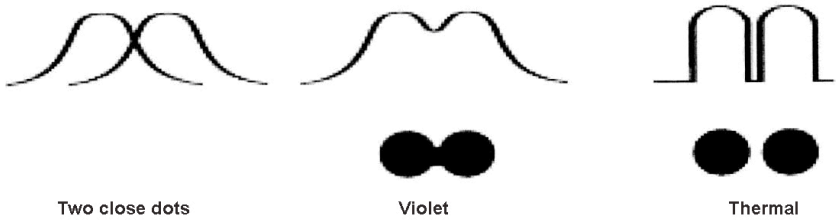


Figure 2- The development of two close dots exposed in the thermal and violet plates

2.1. Conventional Plate

Prior to the printing operation with conventional plate, a film output is taken with a tram value of 70. The film obtained transfered into the plate in normal conditions and the printing was started. After the printing, the background density, dot gain and trapping values were measured in time intervals. The following graphics were obtained by the measurements (Figure 3,4,5).

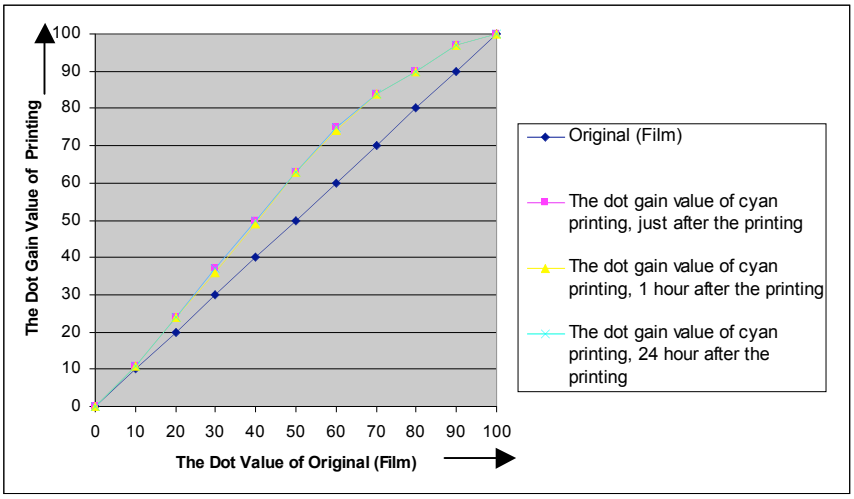


Figure 3- The dot gain graphic of cyan printing with conventional plate

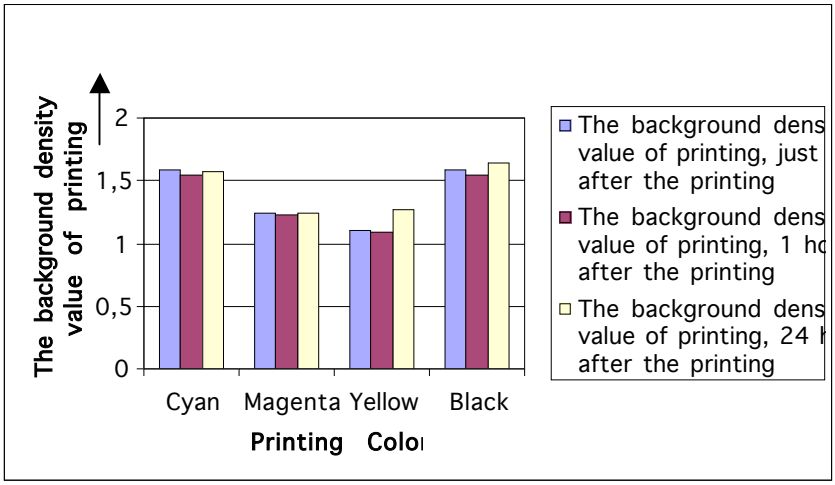
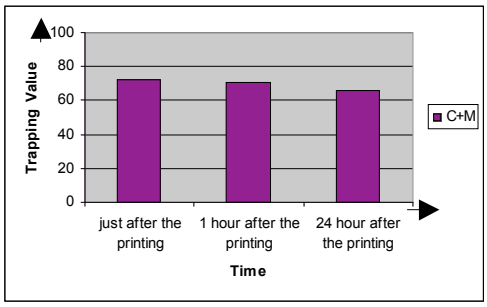
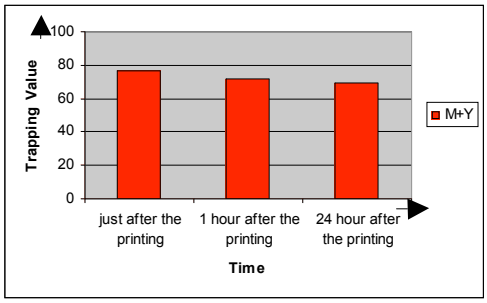


Figure 4- The background density graphic of printing with conventional plate





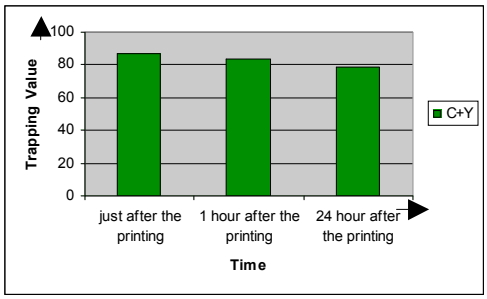


Figure 5- The printing trapping graphic of printing with conventional plate

As can be seen from the graphics above, the values obtained just after the printing, after one hour and after 24 hour were found to be very close to each other and there was no any siginficant difference between them.

In view of background density, the background density decreased in first one hour and it is started to increase in the later 24 hours.

It was observed that the trapping values of C+M, M+Y and C+Y decreased in first one hour and this continued in the measurements after 24 hours.

2.2. Thermal Plate

The same conditions are used in the printing carried out with thermal plate. The property of this plate is that a chemical development is carried out following the thermal exposure. After the printing operation, the background density, dot gain and the trapping values were measured by time intervals. The following graphics were obtained (Figure 6,7,8).

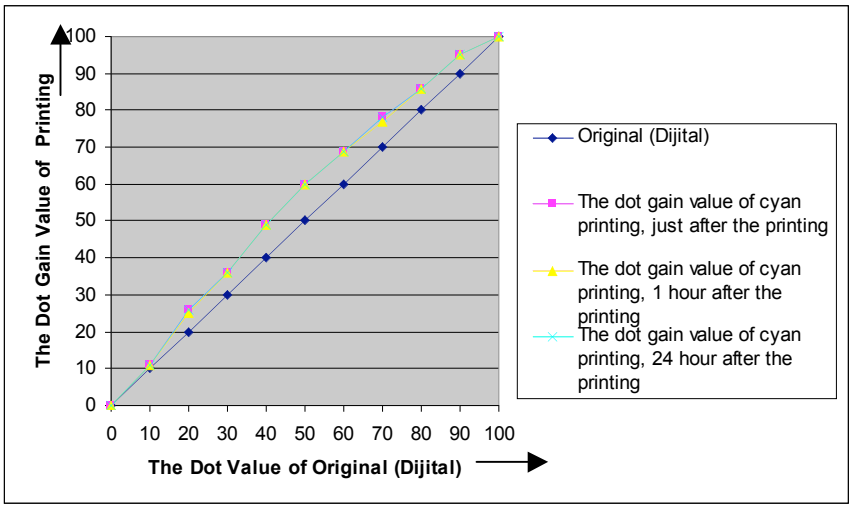


Figure 6- The dot gain graphic of cyan printing with thermal plate

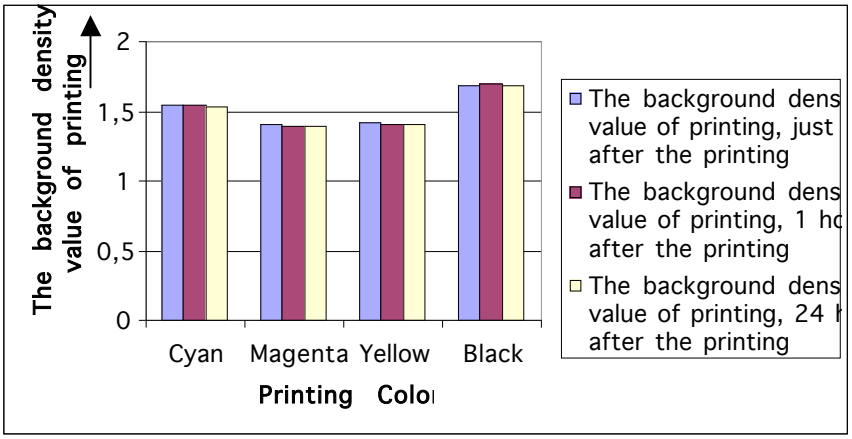


Figure 7- The background density graphic of printing with thermal plate

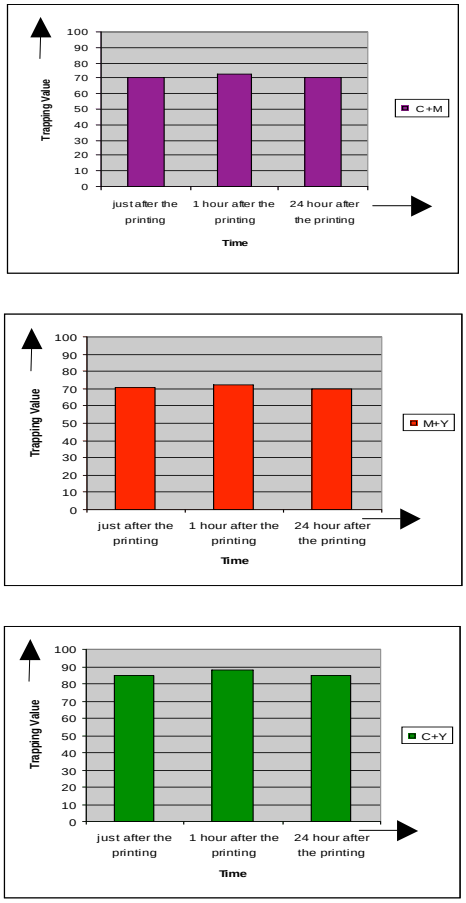


Figure 8- The printing trapping graphic of printing with thermal plate

As it can be seen from the graphics above, in view of dot gain, there was no any siginficant difference between the values obtained just after the printing, after one hour and after 24 hour.

In view of background density, again no difference was observed in the values obtained just after the printing, after one hour and after 24 hour.

In view of trapping values, although the trapping values of C+M, M+Y and C+Y increased in the first one hour compared to the value of the first measurement, the values obtained after 24 hours became very close to the values from the first measurement.

2.3. Violet Plate

The same conditions were also used in the printing procedure with this plate. The main characteristic of this plate is to use a chemical development following the thermal exposure. After the printing operation, again the background density, dot gain and the trapping values were measured by the time intervals. The following graphics were obtained (Figure 9,10,11).

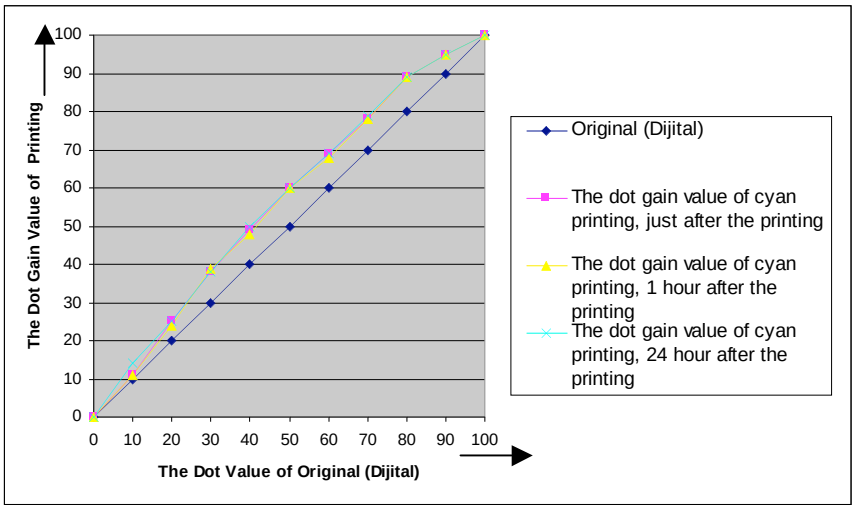


Figure 9- The dot gain graphic of cyan printing with violet plate

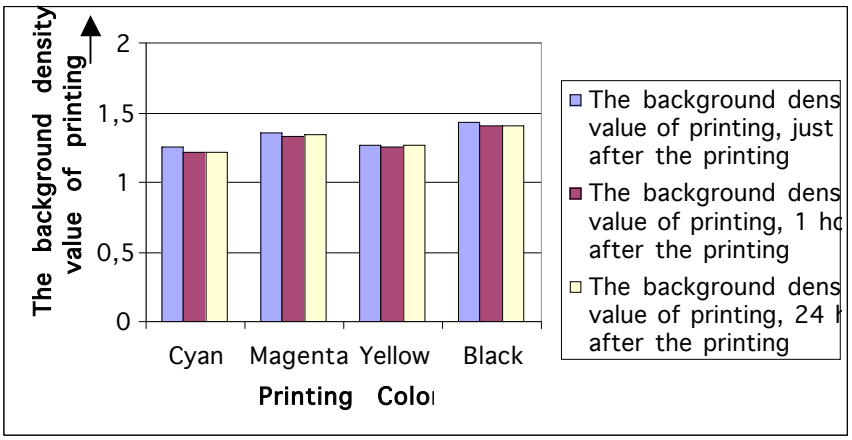


Figure 10- The background density graphic of printing with violet plate

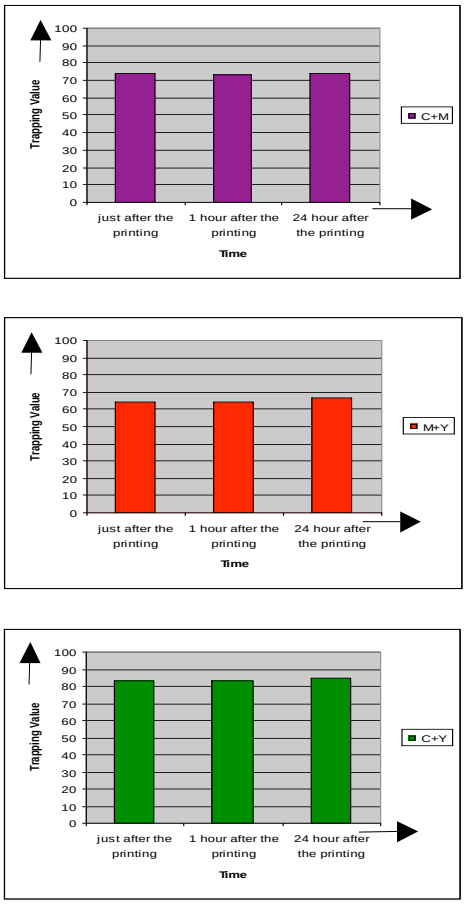


Figure 11- The printing trapping graphic of printing with violet plate

As it can be seen from the graphics above, in view of dot gain, the values obtained just after the printing, after one hour and after 24 hour were found to be very close to each other. Although there was no any siginficant difference between them, the dot gain obtained was in the ideal values.

In view of the background density, no difference was observed in the values obtained just after the printing, after one hour and after 24 hours.

In view of trapping values, there was no any significant increase in the trapping values of C+M, M+Y and C+Y in the first one hour, but a slight increase was seen in the measurement after 24 hours.

Results

In the conventional method, it is not possible to obtain a dot strucyure of continuously same quality because of the variations during the process. However, if the machine is not calibrated properly and the user is not educated, then a dot with the desired standards may not be obtained.

CtP systems have advantages in view of both chemical material usage and the time compared to the conventional system.

1- If we evaluate the dots of 40 and 80 in line with the accepted standards, the dot gain value of conventional and violet plates are slightly higher than the thermal plates. However, these values are in the acceptable range to the ISO 12647-2 standart (Figure 12).

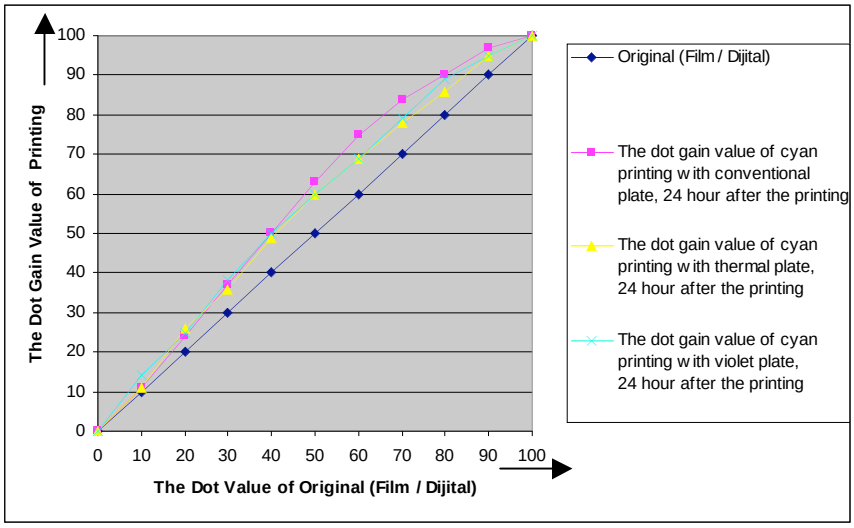


Figure 12- The dot gain graphic of the cyan print with conventional, thermal and violet plates measured after 24 hours.

2- The following dots were obtained respectively : the dots between 3-97% with conventional plates ; 1-98% with thermal plates ; 2-98% with violet plates. Therefore, it was observed that a more detailed view was obtained in the printing with thernal plates.

3- Following the printings, the background density values were not significantly different in all types of plates used.

4- Because of the constant printing conditions and the inks with the same properties used, the trapping values were also not significantly different in all types of the plates used.

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