THE COMPARISON OF PRINTS PRODUCED BY CTP AND CONVENTIONAL PLATE

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SUMMARY

CtP which was first introduced into the printing sector in Drupa Printing Fair in 2000 has recently started to be used intensively as its price was lowered and its physical appearence was minimised. In the last two years, nearly all of the big printing houses became extensive users of CtP. It is clear that the printing quality of the plates prepared by CtP is better than the plates prepared by ordinary films. As there are limited technical references, the sector is still faced with problems in the usage of CtP.

In the present study, a photograph in a ISO 300 standart and a UGRA 82 plate control scale were posed together to form a film and CtP into the plates. A print was done into Exprint 300 g/m^2 cartonboard produced by Kartonsan cartonboard factory, the biggest producer in Europe with CMYK inks.

It was tried not to change physical conditions during the preparation of the plate and the print. The tramtone values in the plate were passed unchanged.

In addition, the optical and mechanical dot gain were measured on the plates. The quality of dots on the surface of the plates was viewed by an optical microscope. The mechanical dot gain, trapping and solid tone values were measured by a printing densitometer at the surface of the printed matter and these parameters were graphically evaluated.

INTRODUCTION

CtP (Computer to Plate) systems which were first introduced into the global usage in Drupa 2000 fair have a qualification of technological revolution. Today, it is, possible to prepare plates with CtP for the offset and flexo printing systems. The system is of an important value in terms of economy and it requires very short time during the preparation stage to the printing. Especially, it is a very successful system for publishing newspapers, journals etc. which require very short times for printing. However there are some application problems with CtP. In addition, the printing houses stil discuss whether this plate preparing system is necessary in terms of quality. In the present study, this matter evaluated by test prints from offset printing. Especially, there are a few hundred offset CtP and a few flexo CtP in the last three years in Turkey. It is thought that the results from the present study would be answers for the technical problems of offset printing houses.

CTP SYSTEMS

Plates with Silver Halide

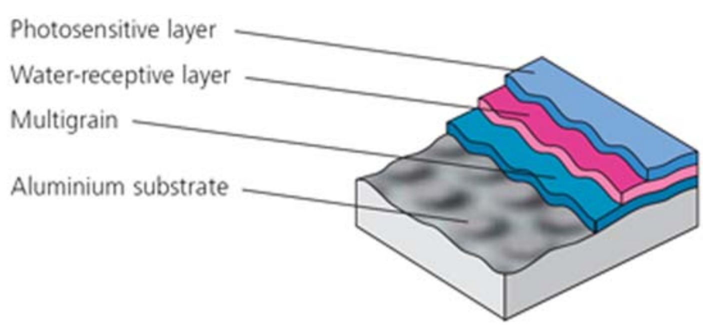
Silver halides (silver salts) makes a light sensitive layer. The energy required for imposing the plates which are sensitive at 410 nm. are only 5 mw. These are the plates rapidly imposed with low energy. Especially, the price of violet diyote lasers are recently somehow lower and these have a long life causing lower cost.

In the view quality, it can be reached into a value of 2–98 % at 250 lpi. The dark room light is yellow. These are positive plates the areas which is not laser view are imposed and these areas removed during the development. The image areas are, reduced metalic silver placed in the anodic layer of plate during the development. These are the areas which will accept the ink. The run length to 350.000 can be obtained with these plates. The oven procedure is not applied.

The non-imposed areas in the positive plates are the parts which the printing occured. During the imposing, the laser light are imposed the non-printed areas of the plate. The silver which does not and silver ions diffused in to aluminium and the final view the argent is now fixed. Then the gumming procedure is carried out.

Photopolymer Plates

These are specially used in the newspaper printing with strong printing performance. Oven procedure is applied and the run length rises up to one million. There are two kinds of photopolymer plates ie. Violet and Green. The lasers used are violet 410 nm and green 532 nm.



Picture 1. Photopolymer Violet Plate[4]

Thermal Plates

It is the first generation negative type preheats after exposure. It requires expensive high energy laser. Recently, the second generation was introduced into the market. It is positive type and doesn't require preheat.[3]

Strong lasers are used for the plates which are imposed with thermal changes. The energy used are very high. In order to be very rapid, the laser must be strong. Run length is up to 150.000.

If oven procedure is applied, it could rise up to one million. These are suitable for uv inks. In the view quality, the values of 2–98 % at 250 lpi can be reached. These plates work positively and these can be kept at the day light.

Non-ablative thermal plates. The system used in the plates is the phase change of polymers. The thermoplastic particulates in the imposed area of the plate which was imposed at the thermal plate change phase. The non image area cleaned by the ink cylinder. The run length can be reached up to 50.000-100.000.

Thermal ablative plates. They don't need a chemical procedure. It requires a special digital impose system. Aluminium carrier layer is coated with a thin layer of silver. It used a continueus diffusion system. This is imposed with 1064 nm – 1080 nm laser. The non-image areas are removed form the plate with the termal ablation system and the image areas are left.

In these plates which don't require chemical development, laser removes the emulsion and the emulsion parts must be removed form machine area in a way. For this, there is a funnel system placed in the machine system. These are positively working plates. They can be used in thermal CtP. After the imposing, the cleaining of the plate can be achieved with top water and on any chemical is required. In addition an air conditionin system is required in the areas which these plates are used with these plates the image quality (830 nm) is 2-98 % at 250 lpi and the run length could be reached to 100.000.

Table 1- General properties of digital plates

General Properties of Digital Plates				
	Argent Halide Plates	Photopolymer Plates	Photopolymer Plates	Thermal Plates
Light Source	Violet	Violet	Green	IR
Wavelength	400-410 nm	400-410 nm	488-532 nm	830/1064 nm
Laser Force Required	5 mW	30 mW	100/200 mW	20/60 W
Dark Room Light	Yellow	Yellow	Red	Day Light
Run Length (Unbaked)	350.000	200.000	400.000	150.000

EXPERIMENTAL PART

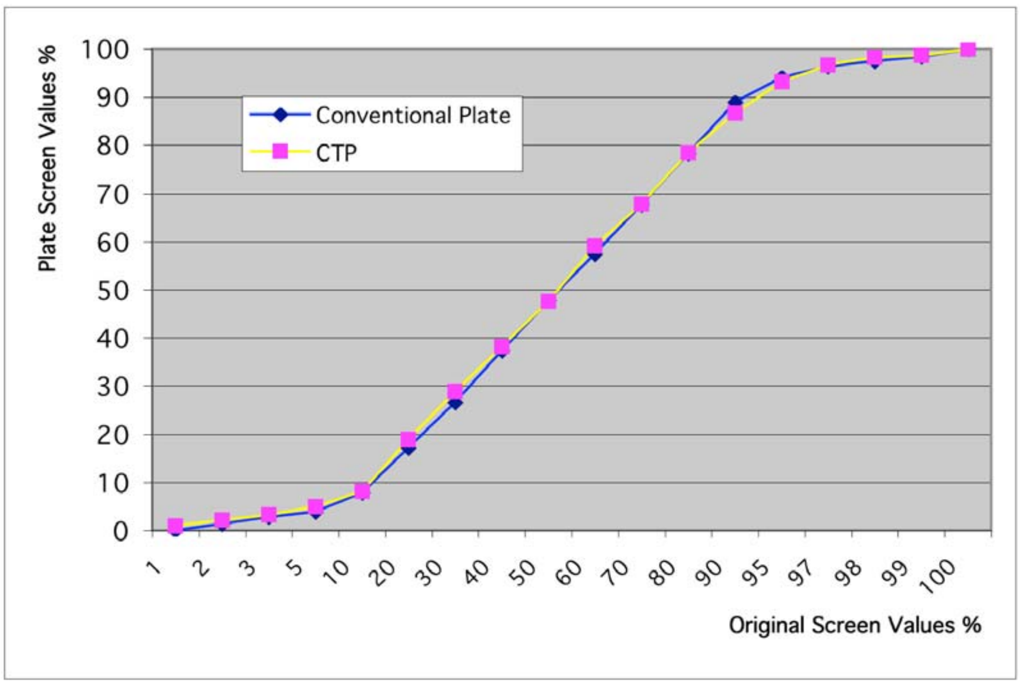
The sun chemical ink with the formulations described in table 2 and fuji photopolymer violet CtP and conventional plates were used. 300 g/m^2 Kartonsan exprint coated carton as a substrate and Heidelberg SM 36*52 cm as an offset printing machine were used.

Table 2- The properties of sun chemical ink used in the present study.

	Organic Pigment	Rosin Modified Phenolic Resins	Vegetable Based Oil	Mineral Oils	Dries
Sun Chemical	12 - 19	18 - 27.5	5 - 10	22 - 30	1.5 - 3.5

Table 3- The properties of 300 g Exprint carton used in the present study.

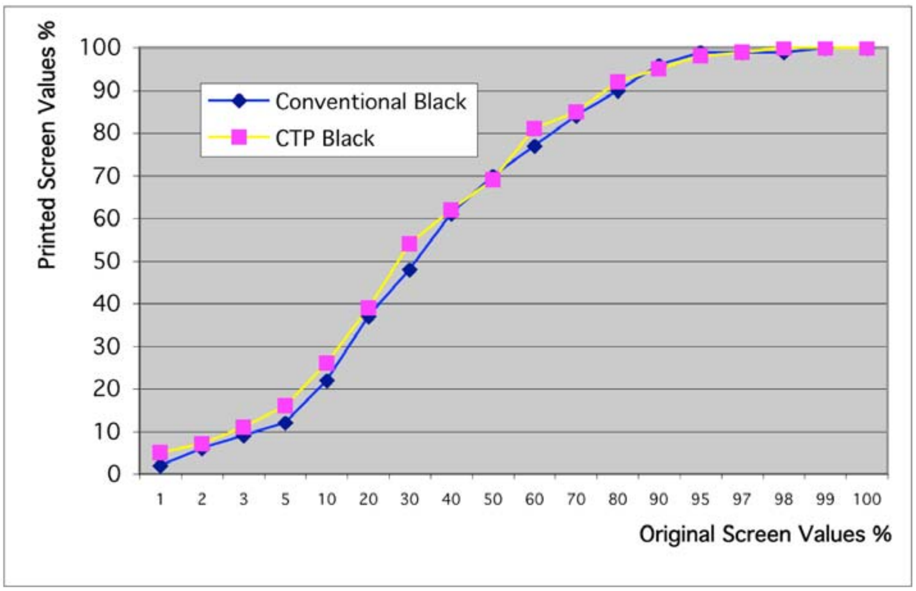
EXPRINT 300 g/m^2			Tolerance	Test Method
WEIGHT IN GRAMS	g/m²	300	± 5 %	ISO 536
THICKNESS	µm	385	± 5 %	ISO 534
STIFFNESS (High)	mNm	12,0	± 15 %	ISO 2493
STIFFNESS (Width)	mNm	6,6	± 15 %	ISO 2493
BRIGHTNESS	%	79,00	min.	ISO 2470
$COBB_{60}$	g/m²-H_2O	100	max.	DIN 53132
Test Conditions : 23 ± 1 ^{0}C - RH : 50 ± 3 %				



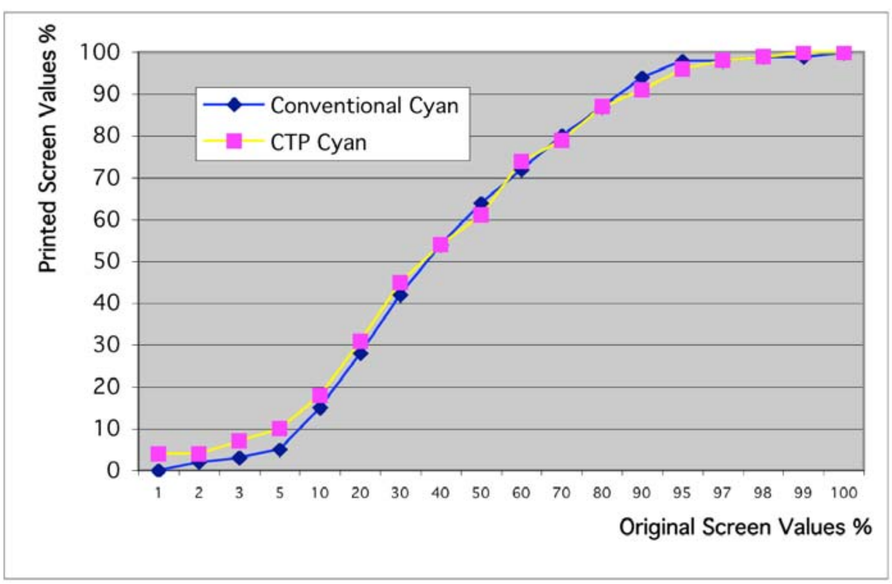
Graph 1. The Dot gain values measured with Gretagmacbeth IC Plate II equipment from CtP and conventional plates.

Table 4- Standard dot values for the prints described for the ISO 12647-2 (1996).

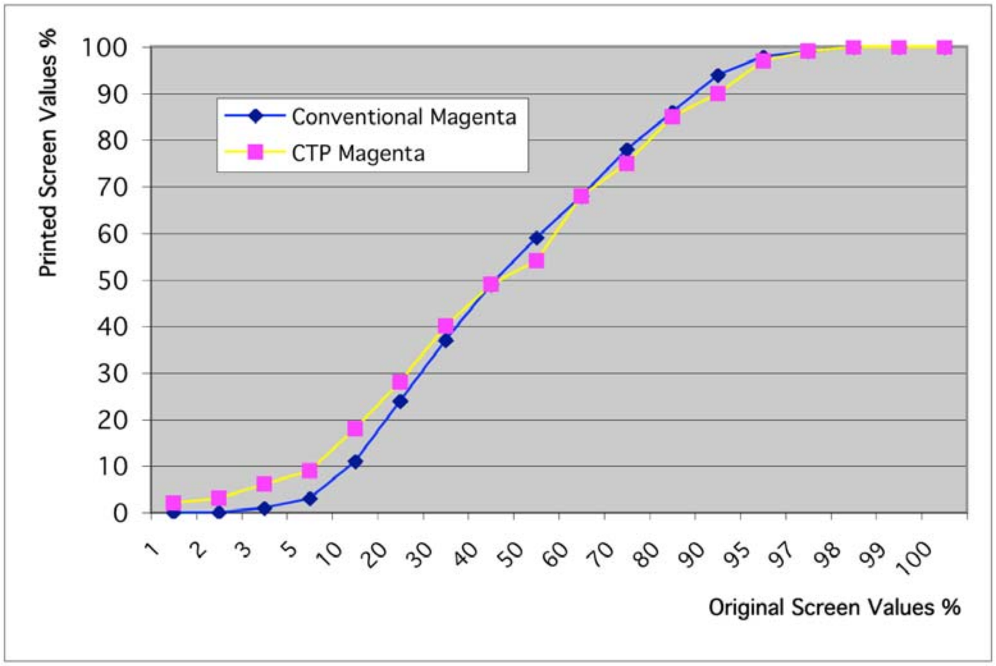
	Colour	Density	Tolerans	Dot gain 80%	Tol. %	Dot gain 40%	Tol. %
Coated Paper	Cyan	1,45	± 0,10	9	± 2	14	± 3
	Magenta	1,4	± 0,10	9	± 2	14	± 3
	Yellow	1	± 0,05	10	± 2	16	± 3
	Yellow 47B	1,4	± 0,10	10	± 2	16	± 3
	Black	1,85	± 0,15	10	± 2	16	± 3



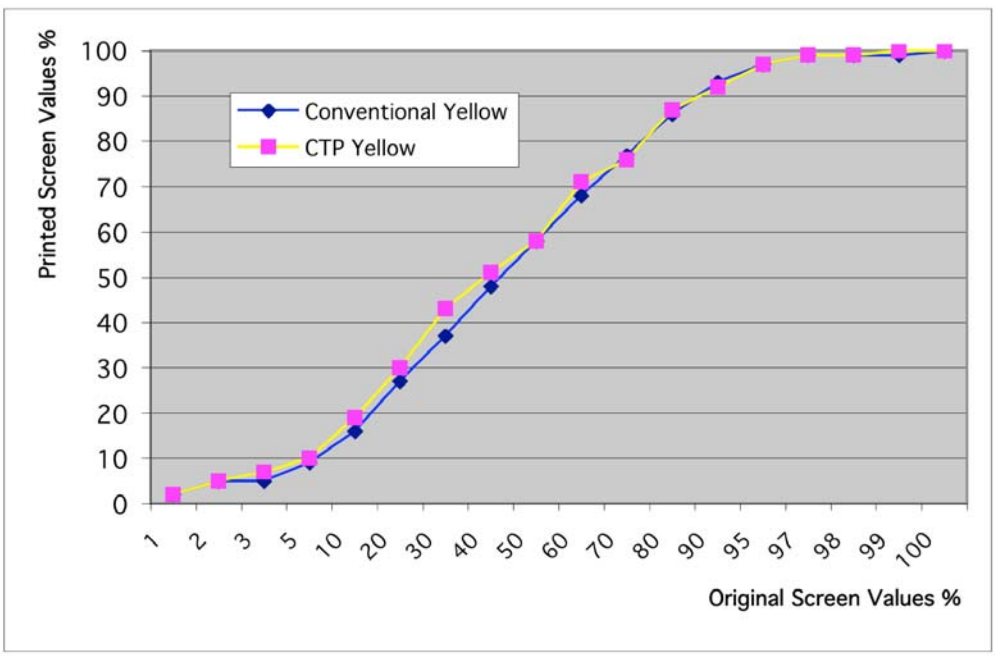
Graph 2. Black ink dot values for the prints obtained with Conventional and CtP plates.



Graph 3. Cyan ink dot values for the prints obtained with Conventional and CtP plates.



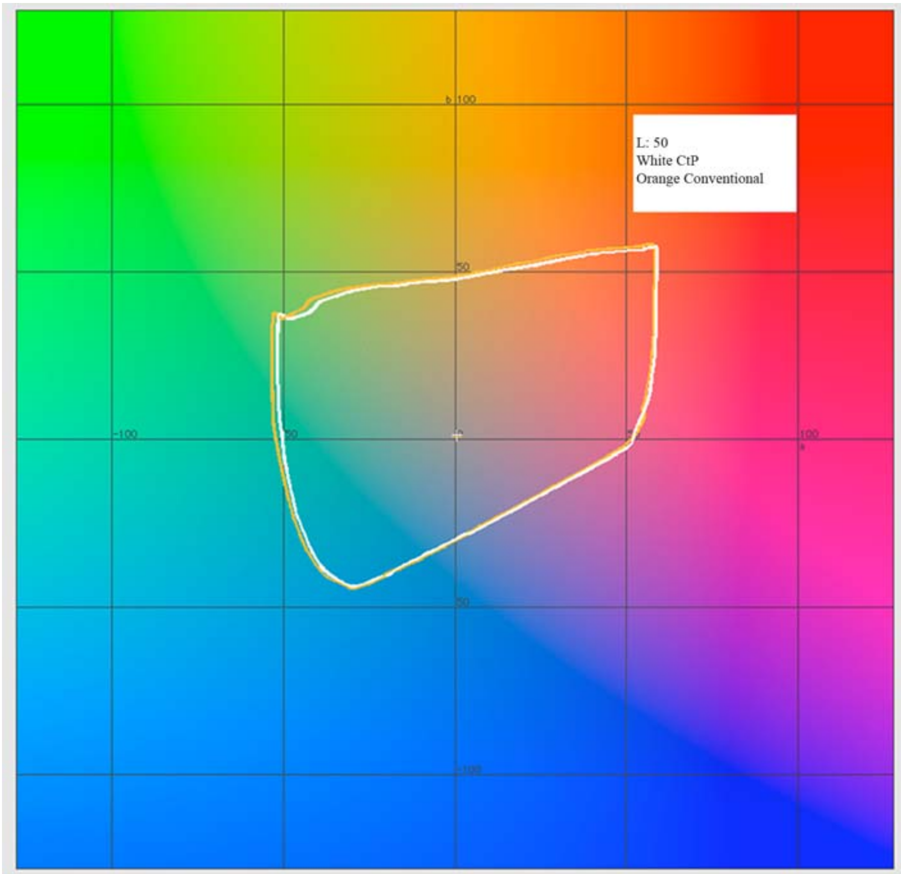
Graph 4. Magenta ink dot values for the prints obtained with Conventional and CtP plates.



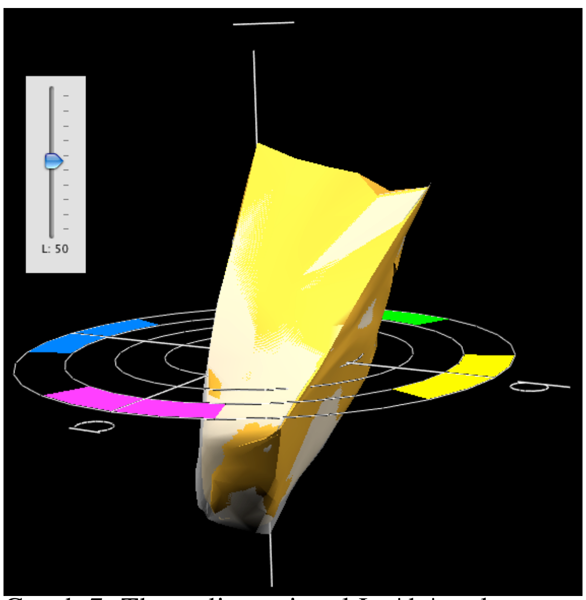
Graph 5. Yellow ink dot values for the prints obtained with Conventional and CtP plates.

Table 5- Trapping measurements taken during the printing.

Trapping Value	CTP				CONVENTIONAL			
1. Solid	D_C	1,43	D_C	1,43	D_C	1,44	D_C	1,44
2. Solid	D_M	1,48	D_Y	1,38	D_M	1,46	D_Y	1,39
Overprint	T_{MC}	75%	T_{YC}	80%	T_{MC}	77%	T_{YC}	81%



Graph 6. Two dimensional La*b* colour gamut obtained from the prints with CtP and Conventional plates with Profile Editor program is used



Graph 7. Three dimensional La*b* colour gamut obtained from the prints with CtP and Conventional plates with Profile Editor program is used

CONCLUSION

The investigation and measuraments carried out with a densitometer and spectroeye at the printed surface prepared with these plates. The printing plates were prepared in the optimum conditions. The following conclusions was achieved.

The dot gains on the CtP and conventional plates are in the accepted tolerances and these values are very close to each other (Graph 1). From the trapping measurements obtained from the printed material, it was seen that the ink transfer from the plate through the printing blanket to the surface of the substrate is very good. In addition, the acceptance of ink is excellent (Table 5). The densitometric values of CMYK colours are fit in standard values (Graphs 2-5).

ECI2002R CMYK test scala was read in the Spectroscan equipment by the aid of Gretagmacbeth Measure Tool program. From txt files obtained, the printing profiles of prints prepared with CtP and Conventional plate were obtained by Profile Maker program. Then the La*b* colour gamuts were obtained by Profile Editor program. It was observed that the colour gamuts at the La*b* colour plane are nearly overlapped by each other (Graphs 6-7). Finally, it was observed that there was no any unaceptable difference between CtP and Conventional plate printings in the case of optimum preparing conditions and at the optimum printing medium.

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REFERENCES

1. Unal H., Akgul A., Buyukpehlivan G., Kaygusuz A.,: Modern Digital Plate Technologies, First International Printing Technologies Sysposium, September, 2003
2. Holland, C.: Understanding CtP Technology, January 1997
3. Reports 1998, “Research on CtP Printing System” , Japan Federation of Printing Industries, http://www.jfpi.or.jp
4. Technical Report, “Faster Make Ready and Higher Quality Results” Fuji Photo Film Co., 2002, Japan
5. Gretag Handbook 1995, Zurich, Switzerland
6. Doyle, S., “CtP Using Violet and Infra-Red Platesetters”, Kodak Polychrome Graphics