



## WAYS TO PRINT CERTIFICATES ON CREATIVE PAPER

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*Abstract: The application of creative papers poses new challenges on the printing industry. The creative print carriers are to ensure the expected quality. The modern digital technologies call for the paper print carriers corresponding to the intended technique.*

*Keywords: creative paper, inkjet printing, smoothness*

### 1. INTRODUCTION

Demanding and interesting group of the printing media products is gala packaging, special wine labels, company flyers, menu cards and other exclusive products like college certificates as well. An important aspect of the design of products on creative papers is to wake emotions and sensations about the related the products, the effect on our sensory organs has high priority. Printing media products on creative papers can have elegant, high quality or rustic appearance on recycled substrate. Paper manufacturers help the costumers and the designers to achieve their concepts with their broad variety of products. The choice of the right printing technology is also very important. Accurate prediction of print quality requires the information on the performance of the technology with a creative paper substrate.

### 2. METHODS

The aim of these studies has been to summarize the properties that are to be taken into consideration when printing certificates on creative print carriers with the use of inkjet technology. For the purpose of the studies, 6 different types of creative and 1 handmade paper were used (*Table 1*). The square meter unit weights of the papers were determined, then the smoothness and air permeability of the papers were specified with a Bekk smoothness tester, and in addition the water-absorbing capacity of the papers was examined. The certificates were printed with an Océ inkjet printer, followed by the videomicroscopic examination of the textual parts and the visual analysis of the prints.

*Table 1. Examined creative papers*

No.	Description	g/sq m
1	Wood-free offset KLG	180
2	Papyrus Ivonline	250
3	Spike	340
4	Rives Tradition	350
5	Conqueror Laid Brilliant	290
6	Rives Dot	300
7	Handmade paper	varied



### 3. PAPER STUDIES

#### 3.1 Correlations between the nominal and actual square meter unit weights of creative papers

In digital printing, the uniform square meter unit weight and thickness are important, because prior to printing it is necessary to set the parameters of the print carrier on the computer and the digital printer. However, the square meter unit weights specified by the manufacturers of creative papers sometimes show smaller and larger deviations from the real values. In general, it can be claimed that the nominal value is slightly larger than the real square meter unit weight (*Figure 1*). In the case of sample 5 (Conqueror Laid Brilliant), the measured and nominal square meter unit weights were identical to each other. The largest (40–50 g/sq m) differences were found for the Rives Tradition and Rives Dot print carriers; for both creative papers, square meter unit weights under the values having been specified by the manufacturers were measured. The 170 g/sq m value was calculated by averaging the square meter unit weights of handmade papers.

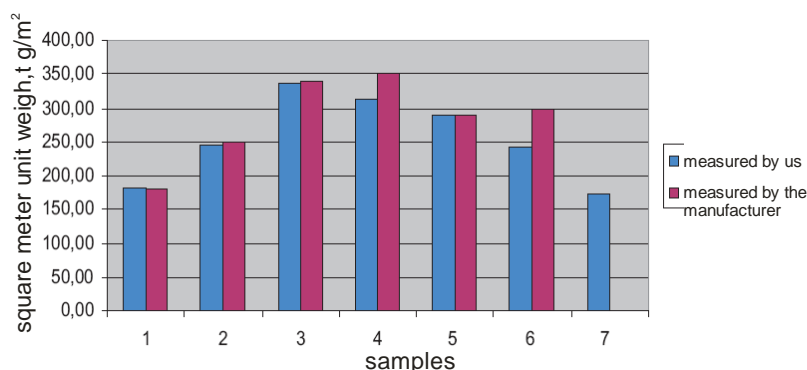


Figure 1. Nominal and actual square meter unit weight of the examined papers

#### 3.2 Water-absorbing capacity of creative papers

In consequence of the inkjet printing technology, it is necessary for the ink drops to become affixed on the print carriers. When the water-absorbing capacity is poor, the print is unsharp, blurred even after drying. When determining the water-absorbing capacity of creative papers, the quantity of water attaching to the surface of the print carriers can be determined by deducting the dry weight of the sample from the weight of the sample dipped in water for 3–4 seconds. To the surface of sample 3 (Spike), a minimum quantity (0.02 g) of water adhered (*Figure 2*). This print carrier is not suitable for producing inkjet prints. The water-absorbing capacity of the handmade paper cannot be determined, because the paper having been dipped in water becomes fully soaked.

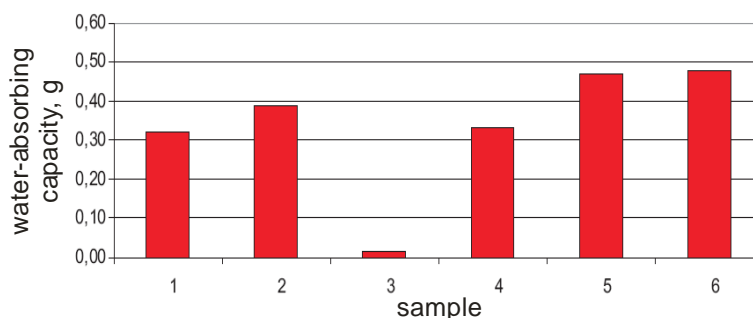


Figure 2. Water-absorbing capacity of the examined samples



The results of smoothness tests (*Table 2*) reflect that from among the creative papers the highest smoothness values on both the wire (25, 83 s) and the upper (31, 30 s) sides are featured by paper sample no. 3. Spike. This print carrier has glossy, coated surface. From among these creative papers, the smallest air permeability values are have been shown by Rives Tradition, Conqueror Laid Brilliant and Rives Dot. Considerable differences have been observed between the smoothness values for the upper and wire sides in the case of the Wood-free Offset KLG paper (paper sample no. 1). The underlying reason is that the wire side of this print carrier has a much more structured surface than on the glazed upper side.

*Table 2. Smoothness values of the examined samples*

Sample no.	Description	Smoothness, s	
		upper side	wire side
1	Wood-free Offset KLG.	1.52	0.39
2	Papyrus Ivonline	1.24	1.16
3	Spike	31.30	25.83
4	Rives Tradition	0.54	0.44
5	Conqueror Laid Brilliant	0.52	0.43
6	Rives Dot	0.72	0.51

The air permeability results (*Table 3*) also confirm that the surface of the Spike creative paper is of closed structure. The air permeability values obtained for the upper and wire sides are all over 300 ml/s, meaning that air can flow through the cross-section of the papers just very slowly. The smallest air permeability value, under 1 ml/s has been detected for the handmade paper owing to its structure.

*Table 3. Air permeability values of the examined papers*

Sample no.	Description	Air permeability, ml/s	
		upper side	wire side
1	Wood-free Offset KLG	7.67	8.33
2	Papyrus Ivonline	5.94	6.43
3	Spike	374.73	333.33
4	Rives Tradition	1.66	1.90
5	Conqueror Laid Brilliant	3.79	3.87
6	Rives Dot	2.12	2.30
7	Handmade paper	0.35	0.52



## 1. DIGITAL PRINTING TECHNOLOGIES

The emergence and development of electronic media have affected printing industry. For digital technologies, two types of systems can be distinguished: Ctpress systems relying on conventional procedures and the so-called non-impact (NIP) systems. The NIP technology has been able to offer new ways to the printed media, e.g. custom-made printing, personalization. It means that the non-impact technology is applied in such special market segments as short-term jobs, office and DTP applications.

### 4. 1 Inkjet printing

Inkjet is a Ctprent technology where ink is sprayed on the print carriers by nozzles; it means that the image is applied to the paper directly. The digital data of a job intended to be printed are directly transmitted to the image control unit. In this case, the imaging unit is the inkjet system itself, which carries the ink via the nozzles. Two types of inkjet technologies can be distinguished: continuous inkjet and drop-on-demand inkjet technologies. Whereas in the continuous inkjet technology just a part of the continuously flowing ink droplets is directed to the paper – as corresponding to the print image –, and the remaining part of the ink is returned, in a drop-on-demand inkjet system ink drops are created only if it is required by the given printing information.

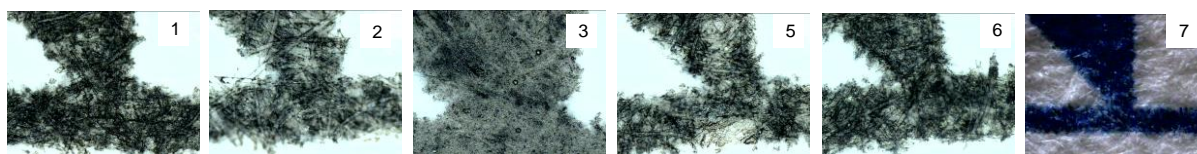
## 5. REQUIREMENTS OF DIGITAL PRINTING TECHNOLOGIES FOR PAPERS

Papers tend to react to humidity, heat and mechanical strains differently. In digital printing, the process of affixing the ink or toner to the paper involves intensive heat effects. For this reason, in electrophotographic printing papers always have to feature a specific moisture content. In the individual digital printing procedures, papers should meet special requirements, and therefore it is important – for instance – to have the correct grain direction and moisture content. When printing digitally, it is important to consider the method to introduce and transfer the print carrier in the printing machine, the technology of toner application, the temperature and time demand of the fixation process. The quality of the prints are influenced by such paper properties as the fiber structure of the paper, the smoothness of the paper surface, the moisture content of the paper, the water-absorbing capacity of the paper, as well as its thermal and electrical conductivity.

The test images and the Certificate have been made with a Canon ix7000 type inkjet digital printer.

## 6. VIDEOMICROSCOPIC EXAMINATION OF THE FONT IMAGES ON PRINTS

Of the font images of the Certificates made on creative print carriers, videomicroscopic images have been taken. At the linking lines of the fonts, it is apparent that the lines of the fonts on Spike (creative paper no. 3) are unsharp, blurred, and this paper is not suitable for inkjet printing. Due to its large square meter unit weight, no print could be made on sample no. 4 (Rives Tradition). The sharpest print has been made on the handmade paper (*Figure 3*).



*Figure 3. Videomicroscopic images of the fonts of the print*



## 7. CONCLUSIONS

A common feature of the examined papers is that they can all be regarded to be creative papers. However, the examination results have proved that not all the creative print carriers are suitable for the making of certificate prints with inkjet printers. The smoothness and air permeability values of sample no. 3 (Spike) are outstanding on both the wire and upper sides, because this paper is strongly smoothed on both sides. This print carrier has also featured the worst water-absorption values. The test print and the microscopic image of the font equally show that the Spike creative paper is not suitable for printing with the inkjet technology. The extreme thickness value of the handmade paper we have produced is likely to be due to the uneven surface. Because of its physical properties, the handmade paper is not adequate for the conduct of some paper studies. It can be claimed, however, that in the light of the sharp print image of the paper, it is suitable for the production of certificates with the inkjet technology.

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