# Opracowanie modelu dwuparametrowej reprodukcji półtonowej w krótkich zespołach farbowych maszyn drukujących

## Model development of two-paramater halftone reproduction in inking units of printing machines

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*Opracowano model odtwarzania półtonów reprodukcji o dwóch parametrach i metodę syntezy procesów przygotowawczych, mającą na celu kompensację nieliniowości procesów rastrowania i drukowania w ciągłych systemach farbowo-drukujących; w artykule przedstawiono wyniki modelowania imitacyjnego reprodukcji liniowej skali rastrowej*
***Słowa kluczowe:*** *zespół farbowy, system drukujący, reprodukcja półtonowa, model reprodukcji, nieliniowość, rastrowanie*

*A model of two-parameters halftone reproduction and method of adjustment process synthesis, aimed to compensate nonlinearities of screening and printing processes in consecutive inking units have been developed; the results of imitation modelling of linear screen scale reproduction have been offered in this article*
***Keywords:*** *inking unit, printing system, halftone reproduction, model of reproduction, nonlinearity, screening.*

### Problem definition

The reproduction of halftone images in printing is called half toning as this process means the way of tones reproduction by changing the areas of inked printing elements and spacing. Normally, in offset printing, an ink layer of constant thickness is applied on the whole surface of screened printing elements. Only the printing area parameter changes depending on the optical density of original [1]. Basic processes (screening, platemaking and printing) have nonlinear tone reproduction performance influenced by different factors [1]. Tone reproduction processes of halftone images with constant thickness of ink layer as well their types and schemes, synthesis and adjustment of tone reproduction are well known and clearly described [2, 5, 6, 10, 12].

Many European companies use short inking units (printing systems) supplied with multiple anilox ink rollers for newspaper printing on offset presses. But these devices are of limited use in printing as they do not have enough tools able to control zone ink supply and therefore do not ensure a constant thickness of ink layer applied on the impression surface within the interval of tone reproduction [6, 9]. In the above-mentioned ink-printing systems the amount of ink applied on the surface depends on two things: the area of screen elements and the thickness of ink layer applied on the impression surface depending on the tone reproduction interval. That is why in order to increase the quality of impressions at the stage of screening two parameters should be taken into account. It causes the necessity to solve the task of two-parameter halftone reproduction with change of thickness of ink layer applied on the impression surface. The article describes the design of two-parameter halftone reproduction model and synthesis of adjustment process aimed to compensate nonlinearities of screening and printing processes in short inking units of printing presses.

### Analysis of last researches and publications

In printing industry it is widely used an ink tone reproduction with predefined performance stages and the tone reproduction is fulfilled according to this process. Transformation of original image into an impression embraces many operations (scanning, digital processing of images, screening, exposure, origination, printing, etc.), and has its own performance stages, connecting input and output transformations of images signal, properties of

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