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DESIGN OF MODERN TOOLS FOR DIGITAL OUTPUT RASTER SCANNING

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K e y w o r d s: test-object, resolution, output scanning device.

A b s t r a c t

Quality control at all stages of the polygraphic process will allow to establish a feedback between technological processes of printing. The validity of the selected criteria, technological effectiveness and objectivity of the quality assessment methods will allow to organise technically accurate modelling of the processes as well as to promptly interfere with the production process if necessary. The tendency of the development of technologies and control tools as well as computer expansion are the reasons why the objectivity and impartiality of the assessment become the main criteria for the choice of method for quality assessment of the polygrafic product. Methodological purpose of the quality control is to make the polygrafic process technologically driven and stable, and the quality of the received print – more predictable.

Introduction

Current international standards and regulatory materials governing the operations of quality control, thus achieved the necessary quality printing products. Today, the printing market increasingly prevalent technology of making printing plates by digital image output to the forming material, known as Computer-to-plate-technology, which differs from the traditional lack of stage separations getting (TIKHONOV 2000).

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Improving Computer-to-plate-technology promotes the development of digital monitoring forms. Typically, PostScript-file that allows you to verify the accuracy of the output of digital systems, including printing plates, generating elements that contain a variety of test objects that can measure the exposure resolution.

In today's competitive environment one of the key issues is ensuring consistently high quality printing products while minimizing costs. Modern printing companies realize the need for certification as an important factor in achieving this goal. Standardization is particularly relevant in light of current trends to reduce the circulation of orders because it promotes the competitiveness of offset printing (HAVRYSH, YUSCHYK 2015).

For the evaluation of the quality of offset printing plates appropriate measuring control strips have been developed and new types of measuring devices are also created (GNAWALI et al., 2013, *Control of CtP…* 2015).

Quality control tools

The control processes have become more computerized and automatized; due to this automatic measurement tools as well as network digital control systems (complexes) are more actively implemented in the production process, which allows to carry out overall control at all stages and phases of the process. Implementation of electronic complexes gives the opportunity to promptly interfere with the production process at a particular point.

The objective of the invention is to work out a scale for the resolution control of output scanning devices by means of software synthesis of the control elements of the scale which will allow to visually assess the actual resolution of a raster output scanning device, such as laser and inkjet printers, system "Computer-to-film", "Computer-to-plate", "Computer-to-press" and digital printing machines.

This is possible as the scale for resolution control of the output scanning devices, that is composed of the elements for resolution assessment of fast, slow and 45° angled scan directions, gives the possibility to assess the actual resolution of these devices.

Development of the scale for resolution control

The structural scheme of the scale for resolution control of the output scanning devices is given at Figure 1; it consists of four functional groups that, in turn, are composed of thin annular and straight lines of equal thickness (2.6458, 5.2917, 10.58, 21.17, 42.3, 84.7 μm) (HAVRYSH, YUSCHYK 2015).

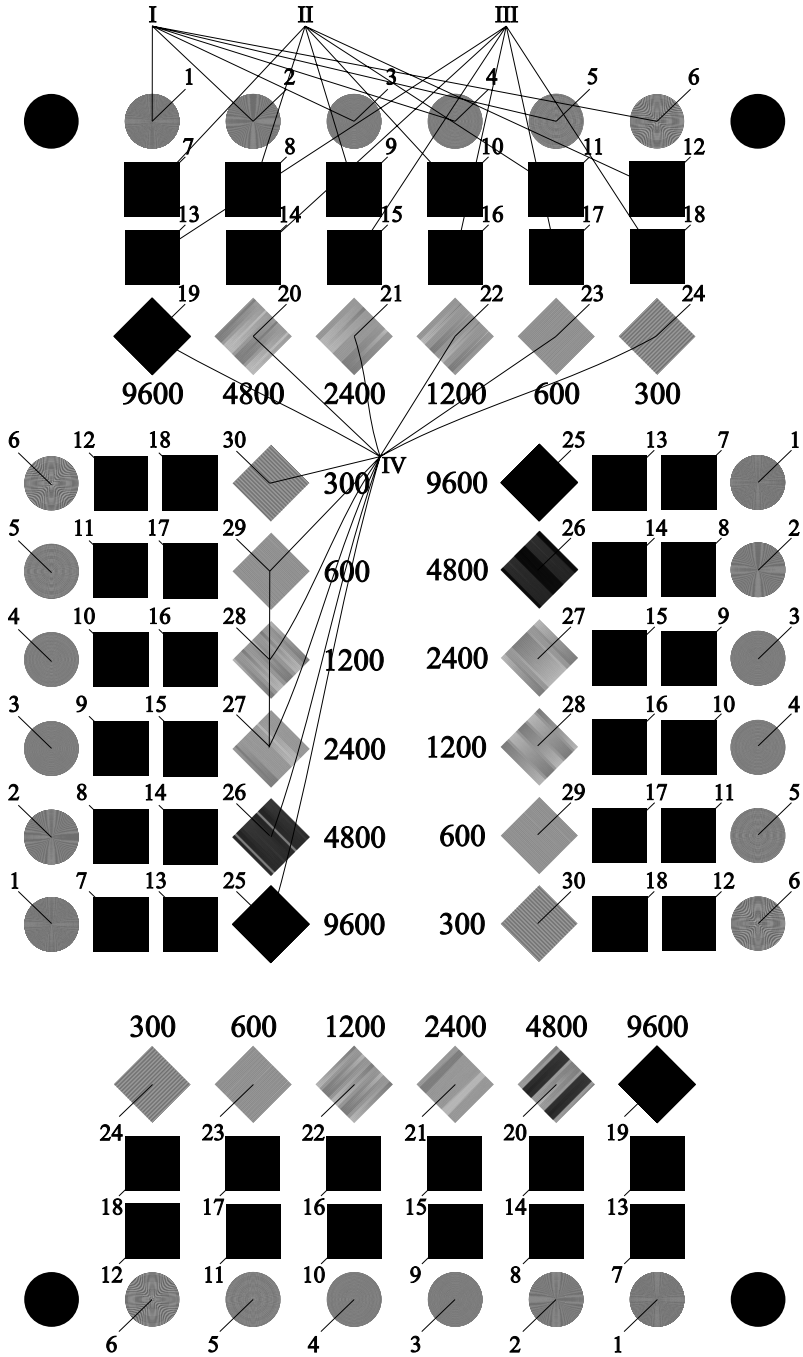
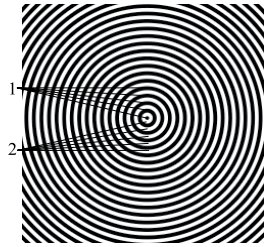
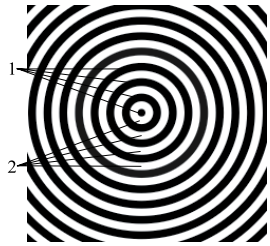


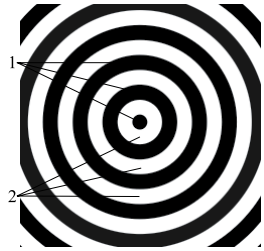
Fig. 1. Test-object overview



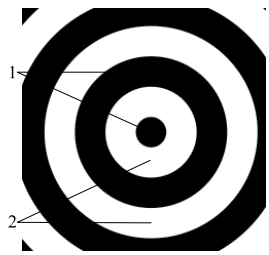
unit 1 Fig. 1 (9,600 dpi)



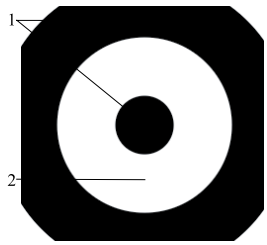
unit 2 Fig. 1 (4,800 dpi)



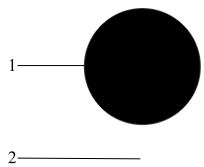
unit 3 Fig. 1 (2,400 dpi)



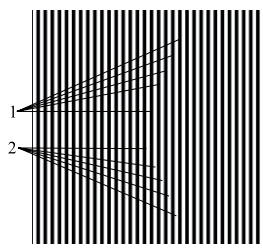
unit 4 Fig. 1 (1,200 dpi)



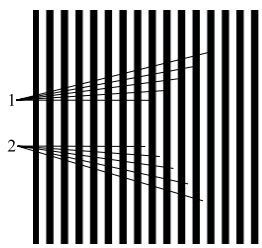
unit 5 Fig. 1 (600 dpi)



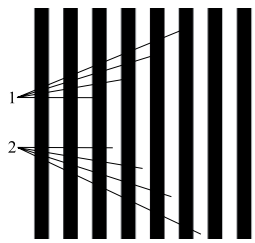
unit 6 Fig. 1 (300 dpi)



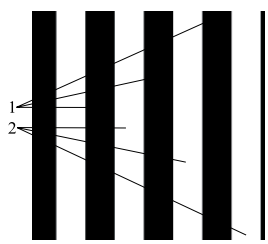
unit 7 Fig. 1 (9,600 dpi)



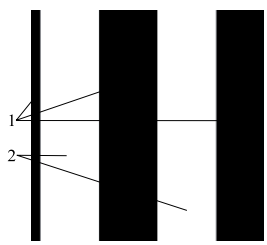
unit 8 Fig. 1 (4,800 dpi)



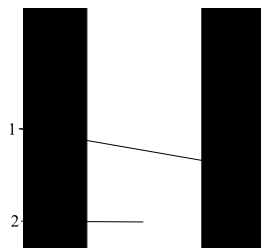
unit 9 Fig. 1 (2,400 dpi)



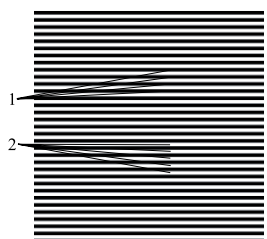
unit 10 Fig. 1 (1,200 dpi)



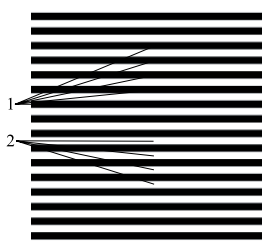
unit 11 Fig. 1 (600 dpi)



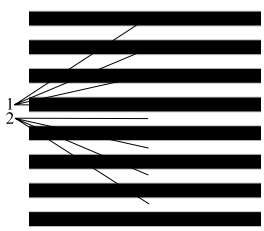
unit 12 Fig. 1 (300 dpi)



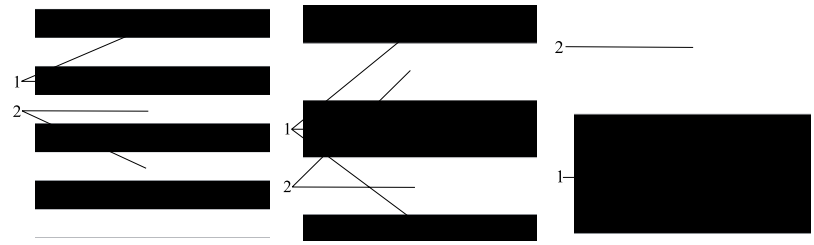
unit 13 Fig. 1 (9,600 dpi)



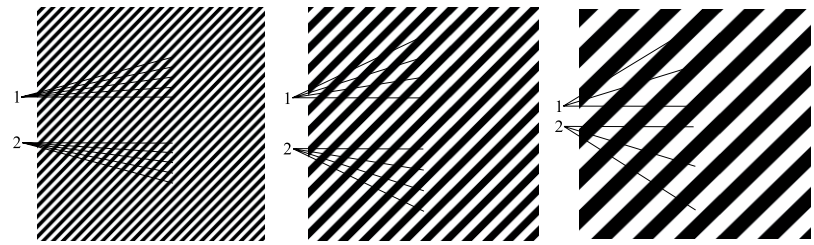
unit 14 Fig. 1 (4,800 dpi)



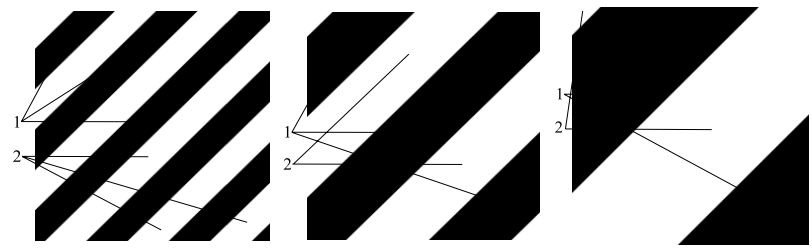
unit 15 Fig. 1 (2,400 dpi)



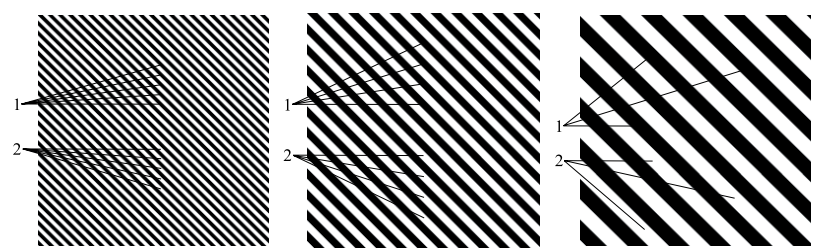
unit 16 Fig. 1 (1,200 dpi) unit 17 Fig. 1 (600 dpi) unit 18 Fig. 1 (300 dpi)



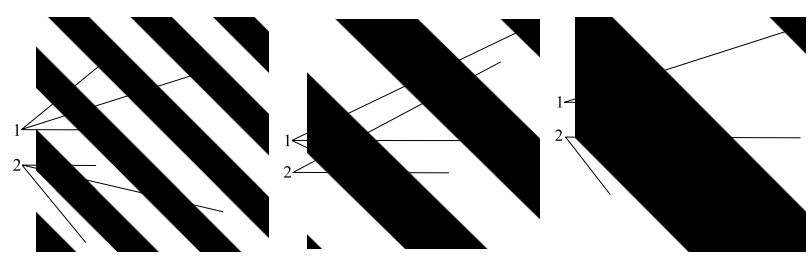
unit 19 Fig. 1 (9,600 dpi) unit 20 Fig. 1 (4,800 dpi) unit 21 Fig. 1 (2,400 dpi)



unit 22 Fig. 1 (1,200 dpi) unit 23 Fig. 1 (600 dpi) unit 24 Fig. 1 (300 dpi)



unit 25 Fig. 1 (9,600 dpi) unit 26 Fig. 1 (4,800 dpi) unit 27 Fig. 1 (2,400 dpi)



unit 28 Fig. 1 (1,200 dpi) unit 29 Fig. 1 (600 dpi) unit 30 Fig. 1 (300 dpi)

Fig. 2. Enlarged test scale fields for different resolution values (enlargement 37,000%: 1 – line, 2 – gap between lines)

The working scheme of the scale for resolution control of the output scanning devices is as follows: the program file with the control scale is transferred to a sheet, photo material or multimetal plate by means of the raster scanning device (Fig. 1), and the resolution value at which the control elements are reflected without distortions is visually set (Fig. 2). Then, for correctly reflected resolution fields, the measurement of integral optical density value is carried out (SHCHADENKO 2009, NAGORNOV 2004); it shall ideally amount to 0.3 for 50% line gauge. On the basis of the deviation from this value the conclusion regarding the accuracy of the settings of the raster output scanning device is made.

The given scale for the resolution control of the output scanning devices allows to assess the accuracy of the main settings of raster output scanning devices (HAVRYSH, YUSCHYK 2015).

The given test-object refers to the scales for prompt resolution control of the output scanning devices, such as laser and inkjet printers, laser photo-exposing printers, computer-to-plate systems, computer-to-printing machine systems, and digital printing machines.

The test-object for the resolution control of the output scanning devices allows to assess the accuracy of the main settings of the raster output scanning devices.

The test-object for the resolution assessment of the output scanning devices given at Figure 1 is composed of four functional groups, each of which has 6 elements of 9,600, 4,800, 2,400, 1,200, 600, 300 dpi resolution.

Functional group I contains thin annular lines (elements 1–6), functional group II – thin straight vertical lines (elements 7–12), functional group III – thin straight horizontal lines (elements 13–18), functional group IV – thin straight 45° angled lines (elements 19–24) and thin straight 135°angled lines (elements 25–30) (HAVRYSH, YUSCHYK 2015). In the bottom part there are elements that are identical to the elements of the upper, left and right parts.

The test-object for the resolution assessment of the output scanning devices is used as follows: the test-object is transferred to a sheet, photo material or multimetal plate by means of the raster scanning device, and the resolution value at which the control elements are reflected without distortions is visually set. Then, for correctly reflected resolution fields, the measurement of integral optical density value is carried out (SHCHADENKO 2009); it shall ideally amount to 0.3 for 50% line gauge (LINSLEY 1980). On the basis of the deviation from this value the conclusion regarding the accuracy of the settings of the raster output scanning device is made.

Figure 2 shows elements of blocks of circular, vertical, horizontal and 45º and 135º angles with a resolution of 9,600, 4,800, 2,400, 1,200, 600, and 300 dpi with an increase of 37,000%.

Conclusions

It is developed the technique of estimating the accuracy of reproduction of information by raster scanning devices of output on the reproduction of raster and dashed elements of control scales.

For real images, in the case of degradation of resolution (mismatch of the raster scanning output device), it is necessary to apply image processing using recovery methods with the automatic selection of parameters, which will allow clear images of test object fields with high resolution (higher than 1,200 dpi).

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