

ABSTRACTS

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THE STRUCTURAL FUNCTIONAL MODEL OF THE INFORMATION TECHNOLOGY PREDICTION OF THE DESCENT INSTALLATIONS DESIGN AND REALIZATION QUALITY

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Research methodology. The scientific study uses the methods of systematic analysis for the selection of technological procedures and formation stages to build a structural functional model of the technology information forecasting quality of the book editions descent installation design and implementation, and the methods of fuzzy logic to predict the quality of design and implementation of installation runs.

Results. The structural and functional model information technology forecasting quality of design and implementation of the book editions descent installations has been projected, reflecting the nature and phase sequence and functional procedures of information technology of the runs planning and getting assigned to them, and the relationships between them.

Novelty. The structural and functional model information technology forecasting quality of the design and implementation of the book editions descent installations based on multilevel models as factors studied processes and fuzzy logic has been designed, a priori providing for the necessary circulation quality.

The practical significance. The implementation of the structural functional model provides for a predictable installation process to obtain the book editions installation runs in numbers of process parameters, which a priori would ensure proper circulation quality.

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TRAINING LABORATORY COMPLEX OF ARRANGED HIERARCHICAL AUTOMATIC OPERATING SYSTEM (AOS) OF PRINTING PROCESSES

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Research methodology. During its elaboration the training laboratory complex (TLC) has been using a conditional arrange of industrial networks on the three hierarchical levels: the industrial network of the level of sensors and executive mechanisms; the industrial network of the level of controllers; the information network.

Results. The TLC for students to get experience in design and work with SCADA system for physical models of real printing objects control built on the basis of expanding of the ASM printing process of programmable logic controllers (PLC) made by SIEMENS and national MIK-51 small-channel controllers has been introduced in the educational process.

Novelty. The training technology for students to obtain the knowledge faster through the exercises with creation control software for digital management system of printing industrial process during skillful identification and considering the management algorithm while using usual infrastructure input/output process devices and exercises from outright accumulation data and visualization data has been developed.

The practical significance. Using the elaborated TLC students learn essential principles of programming of the SCADA/HMI printing manufacturing system with programming languages of controllers according to the MEK 61131 standard, such as LD, FBD and IL and get working experience with a touch screen. The TLC gives a possibility to verify on practice various management algorithms and object identifications, to compare the results of theoretical modeling with a real experiment.

UDC 004.72+004.032.6+378

MATHEMATICAL MODEL STRUCTURE OF HIERARCHICAL STANDARDS INFLUENCING THE DESIGN QUALITY OF ELECTRONIC EDITIONS FOR CHILDREN WITH PAROPSIS

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Research methodology. The stages and technology system matrix analysis and graph theory have been applied for basic research results in the scientific work. Namely, to structurize relationships between factors influencing the design process of electronic editions for children with paropsis, the methods of graph theory have been applied. To build a hierarchical structured model of priority factors influencing the design of electronic editions, the methodology matrix with system analysis and the theory of hierarchical systems have been used.

Results. The main result is the selection of the set of electronic edition design factors. The graph of links between factors that affect the design process of electronic editions for children with paropsis has been constructed. The mathematical hierarchically structured models of priority factors which influence the design of electronic editions have been done. It will enable the stages of design editions to identify the main factors in the degree of their influence on the development of the edition.

Novelty. The links between the factors which influence the design process of electronic editions for children with paropsis have been formulated for the first time. The hierarchical model-based design factors with a graph of links between them, distance matrix and iterative procedures, which will ensure the continued use of stages in the development and optimization of electronic editions for children with paropsis, have been defined as well.

The practical significance. The practical implementation of the proposed model is that it will allow a full analysis of the stages of the electronic edition development focused on children with paropsis.

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ARCHITECTURAL ASPECTS OF THE QUALITY ANALYSIS OF ELECTRONIC PUBLICATIONS

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Research methodology. The results of the analysis of technical and integration aspects for assessment of consumer quality of electronic publications have been presented in this work. An electronic edition has been considered as an information system. The impacts which determine architectural aspects of electronic publications have been selected by the system analysis. The strategic and tactical advantages

of the service-oriented architecture of the electronic publishing information system have been determined by the classification methods.

Results. The main purpose of the IT architecture is getting the safe informative services. It defines some principles and some standards for options and usage of hardware platform, operating systems, database management systems, development tools, programming languages, catalogues, security systems, network infrastructure, etc.

The service model of interaction between the applications of general system within a service-oriented architecture is the long-term direction of the IT architecture electronic publication developing.

Novelty. The assessment of an electronic edition quality is a multifactorial problem, which is determined during the design phases, production and operation of the software. The proposed concept of electronic publication as an information system allows to consider its architectural aspects for proper usage.

The practical significance. The consumer IT service quality of electronic publications has been determined by its parameters which define the level of service business processes of the IT services. Building of an effective service-oriented architecture information system requires the evaluation of consumer quality of the IT services for specific information systems.

UDC 778

KEY POINTS IDENTIFICATION IN THE HDR IMAGES

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Research methodology. A method of analysis has been used when searching the solution of the creation of high quality panoramic images. The mathematical principle of research has been used to identify key points of the HDR images. David Lowe's SIFT algorithm has been used to determine the local features of an image that is invariant to changes in image scale and rotation, and partially invariant to changes in exposure.

Results. The peculiarities of the SIFT algorithm has been considered for determination of relevant items. With the help of this algorithm the image with local features has been characterized and identified. The level maximum and minimum in the Gaussian pyramid brightness value have been identified in order to detect the key points, their orientation having been determined, too.

Novelty. The issue of key points identification in the HDR images has been investigated. A method for creating panoramic images from the series created HDR images has been proposed.

The practical significance. The advantage of the method for creating panoramic images from the series created HDR images is an opportunity to provide a higher level of quality of the resulting panorama that will be useful for professional and amateur photographers.

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THE MODERN CONDITION OF THE METHODS AND FACILITIES OF PREPRESS CONTROLLING

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Research methodology. Till recently the image reproducing quality was estimated by raster and linear elements reproducing of control scales. Today at the printing

market the technology of the printed forms making by the digital record of image on the output material, known as a computer-to-plate has been widespreading, which differs from the traditional one by the absence of photoforms stage obtaining.

Results. The use of standard procedures for the ICS scale file revision is not always possible to make an accurate view details at pixel level. The part of microlines and beams is designed to evaluate the sustainability of reproduction and processing of printing plates. Reproducing of the ICS scale requires optimal conditions for the use of CtP as a visual indicator for comparison with microlines and rays on represented printed forms.

Novelty. One of the first major initiatives of the required printing standards combining into a single conceptual framework was made by the Ugra Swiss research center in the year of 2006. The Ugra center offered to certificate not only the produced printing products, but also the quality management system. The proposed system was called PSO (Process Standard Offset – Standardization of flat offset printing). According to the basic standards there was taken the flat offset printing and proof of ISO 12647 family.

The practical significance. Since all ISO 12647 standards allow to estimate only the end result regardless of the total workflow, the PSO system in its procedure also provides certification for compliance with ISO 12646, ISO 3664, ISO 13655, ISO 15930, ISO 15076 and ISO 9000. Due to this during the certification assessment conducted by the integrated production operation, it has improved the control not only over the printing process, but also on the whole chain of production.

For enterprise certification the process is also an element of internal standardization. To achieve a positive result in the company, measures to improve the production process and quality control of each of its stages and a number of regulatory procedures must be conducted. Each stage of production must have technological instructions; measuring devices must be certified or recertified at the manufacturing plant and have the original certificate. Thus, the entire production process should be formalized based on industry standards and norms.

Standardization is particularly relevant for current trends in order to reduce the circulation, as it promotes the competitiveness of flat offset printing.

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SYNTHESIS OF THE DISCRETE RASTER CONVERSION FOR IRREGULAR FRAMES SQUARE ELEMENTS

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Research methodology. One of the important tasks in the synthesis of bitmap conversion is to determine the screen frequency and RIP resolution in which there is a contradiction which depends on the number of gray levels. There has been built another dependence of the number of gray levels to screen frequency of the constant RIP resolution. Besides the considered parameters of screening and resolution, the important technical parameter is the diameter of the laser beam, which is determined by the RIP resolution.

Results. For screens $L=30$ the lpi number of gray levels is 256. When the number of levels of gray screens comes with 40 screens, the lpi is 144 levels. If screens increase to 60 lpi, the number of gray levels is reduced to 64 and does not fully meet regulatory requirements for quality products.

Depending on the brightness of the image the tones can be placed in four shades of absorbance, which correspond bitmap trace elements 1, 2, 3, 4. Highlights can be

placed twelve shades of optical density, which correspond bitmap trace elements 5, 6, 7...16. Grading midtones reproduce trace 17, 18, 19...36. Gray tones and shadows reflect trace 37, 38, 39, 64.... In raster cell dimension 8×8 only four elements have the correct square shape, others are of irregular square shape.

Novelty. The scheme sequence configuration screen elements use the modified adjacency matrix in which the elements numbering corresponds to the sequence of formation and the quantity of gray levels.

The practical significance. The proposed synthesis of discrete raster conversion to square elements of irregular structure with continuous formation of lines and partial symmetry reduces distortion at the manufacturing stage and form printing, which improves the quality of book and magazine production.

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THE QUALITY ASSESSMENT OF REPRINTS BY MEANS OF FUZZY LOGIC

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Research methodology. The method of constructing membership functions of fuzzy sets by using a matrix of pairwise comparisons with subsequent modeling by means of fuzzy logic has been used. The advantage of fuzzy logic is the ability to use expert knowledge about the structure of the object researched in the form of linguistic variables that are associated with the «if-then» rule.

Results. The functions for such indicators of offset prints as optical density of print, level of «gray» balance, precision of ink combinations, dot gain of halftone dots, excretory capacity have been constructed. The equation membership functions and prints' quality value in fuzzy form for low quality $\mu^u = 0,22$, satisfactory – $\mu^z = 0,62$ and high $\mu^e = 0,66$ have been obtained when substituting degrees of membership in fuzzy logic equations that determine the quality of sheet offset printing. Defuzzification of obtained fuzzy values of prints' quality on a «center of gravity» allows to obtain a quantitative assessment of the prints quality. In our example there are 6.61 conventional units.

Novelty. The analysis of offset printing indicators by using an expert linguistic information and «if-then» rules provides a fuzzy logic equation of linguistic variables influence on the quality of offset printing and, accordingly, allows to estimate the quality of the printing process.

The practical significance. The proposed method of prints quality calculating in a quantitative form allows to develop the simulation models of printing quality prediction in the future.

UDC 655.3.066.53+655.3.066

TECHNOLOGICAL FEATURES OF DRYING IN WEB OFFSET AROMA PRINTING

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Research methodology. Monitoring of aroma printing technologies is based on the elements of system analysis being conducted in the present article. The aroma influence on competitiveness, its advantages and disadvantages, methods of

application have been shown. The nature of the drying process based on physical and chemical processes of the print varnish layer fixation has been analyzed.

Results. The process of aroma prints drying on web offset prints in the IR plasma dryers has been investigated. The advantages and the effectiveness in providing for the highest quality products have been shown. The factors which affect the rate of prints drying and fixation of its aroma varnish layer have been found.

Novelty. The process of paper print drying in the IR plasma dryer and advantages of treating paper in a state of free slack with its support on air buffer by the directional flow of air heated by gas burners have been studied for the first time. The process allows to diminish the heat load on the paper, to reduce the number of emergency shutdown during the process of drying of 5-7 meter long papers, moving through the drying machine, to improve the access of coolant to the surface of the varnish layer and to promote more rapid and complete drying.

The practical significance The usage of IR plasma dryers has been shown as a more economic effective way of aroma prints drying in web offset machines which reduces the weight and thickness of a square meter of the paper web and thereby reduces the costs. It has been shown that the design of the dryer has the ability to cut off the hot air supply, to reduce the temperature rapidly at the paper web wear or drying machine emergency shutdown and therefore to avoid the paper ignition.

UDC 655.3.022+676.826+003.24

INFLUENCE OF PRINTING FOILS ON THE EFFECTIVENESS OF THE BRAILLE TACTILE PERCEPTION IN ITS APPLYING BY CONGREVE STAMPING

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Research methodology. The paper researches the peculiarities of the Braille perception applied by congreve stamping and using different printing foils on different cardboards. We have done the expert assessment of relief-dot inscriptions for the blind people, the received results have been processed using the Statistika package for the generalization of experts' opinion.

Results. It has been proved that the best readability and tactile perception is achieved when applying printing foils on the character elements of the relief-dot image in recycling as well as the pulp cardboard. Processing of the expert assessment results using the Statistika package has showed that the opinion of experts is consistent and significant, and the results of the examination can be used for further calculations.

Novelty. We have improved the technological process of the Braille application by congreve stamping on cardboard packaging by selective application of foils on the character elements that enhances their tactile perception and readability.

The practical significance. We have improved the technology of the Braille congreve stamping on cardboard packaging, allowing to improve the exploitation properties of a relief-dot image, the results having been proved by the test in the Lion Education and Rehabilitation Center. Based on the experimental studies we have developed the technological instructions for the Braille package labeling by foil Congreve stamping on the platen press.

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**SOLVING OF THE MULTICRITERIAL PROBLEM
FOR THE RATIONAL DIRECTION CHOICE
OF THE UKRAINIAN HRYVNIA BANKNOTE DURABILITY**

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Research methodology. Solving of the multicriterial problem of the most rational variant of the Ukrainian hryvnia banknote antiwear improvement has been conducted on the basis of the hierarchy analysis method using BOSR (Benefits – Opportunities – Costs – Risks) system, the analysis by expert evaluation of conjugate equations matrices.

Novelty. There have been defined the types of problems to develop banknote producing, which have to be taken into account when making decisions: 1) benefits; 2) benefits-losses; 3) benefits-losses-risks; 4) benefits-opportunities-losses-risks. The criteria and their hierarchies of benefits and losses concerning global aims, i.e. benefits and losses from the various antiwear improvement technologies usage, have been defined.

Results. It has been determined that the most rational variant of the Ukrainian hryvnia banknote antiwear improvement is the simultaneous using of protective varnishing and the base of heightened wearability. The separate usage of the antiwear base and varnishing is also rational enough.

The practical significance. The results of the research can be used while choosing the variants of production development, the banknote one in particular, and also taken into account when taking a variant of the Ukrainian hryvnia banknote antiwear improvement.

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**SYSTEMATIZATION OF THE LABELING AND PACKAGING
PRODUCTION TECHNOLOGIES IN UKRAINE**

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As the title implies, the article deals with labeling and packaging production technologies in Ukraine. The paper is aimed at describing of the place of printing technologies for packaging industry in Ukraine.

The paper has reviewed the information on label and package types, their materials and production methods. The authors have revealed the printing technologies and materials for packaging industry based on the proper printing houses profiles.

The paper begins with a short discussion on the latest researches and publications in which different development trends in packaging industry have been shown. The authors have started with a classification of package types based on function, material, composition, construction and production technology. Further on, the authors have given a comprehensive overview of the labels materials, types and methods of the product labels applying.

Then there have followed a discussion on printing methods and materials for packaging industry based on 307 publishing houses profiles. The results obtained have reaffirmed that flexography is mostly used in packaging. It has been defined that

the offset printing method is also widely used for a long runs, while digital printing being in use only for short runs. It is obvious that the flexography printing method is mostly used due to the high polyethylene and polypropylene demand in the market.

In conclusion the authors have emphasized that systematization of labeling and packaging production technologies in the Ukrainian market shows the trends of using of the flexography and offset printing methods and the materials related to them. It should be noted that digital printing is growing in use among printing houses of short runs production.

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RESEARCH OF THE MICROGEOMETRICAL PARAMETERS OF THE OXYBIODEGRADABLE FILMS

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Research methodology. *To investigate microscopic geometrical surface parameters of the oxy-biodegradable films the 3D AniCam microscope has been used, which allows to capture images of the topography of the surface samples and their profilograms. The key parameters of the films surface layer and the paint pictures roughness have been determined according to the GOST 2789-72 standard.*

Results. *As a result of the research the main roughness parameters have been defined: maximum and minimum values of roughness profile, maximum height and average height of roughness profile. Maximum values of the films 1 and 2 surfaces microscopic asperities reach up 15–20 microns, and for samples 4 and 5 they attain 12–13 microns. The highest profile roughness has been asset for the films based on HDPE — 10.5–13.4 microns, but for the samples of LDPE films this figure is somewhat lower — 7 microns. The paint layer surface is characterized by abrupt changes in microscopic asperities (from 0 to 15–20 microns). The diameter of halftone dots in the films studied samples ranges from 145 to 153 microns.*

Novelty. *As a consequence of the results of the research we have found out that samples of the LDPE films have a smoother surface structure. The presence of the biological impurities in the films structure increases the roughness of the surface layer. This improves paint layer adhesion, but also can cause the serration of the small picture elements contours.*

The practical significance. *The results of the films surface microscopic geometrical parameters research have confirmed that the structure of the biodegradable films surface layer influences significantly the quality of the printed image and its reproduction and graphic performance. Thus, the surface roughness parameters of printing should be highly considered during the choice of the printing options.*

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MATHEMATICAL MODELS IN THE YOUTH MOTOR ACTIVITY ANALYSIS

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Research methodology. *The methods of theoretical and empirical level have been used. 162 boys and 238 girls from urban areas, 260 boys and 326 girls from*

rural areas of Lviv region have taken part in PAQ-A survey. The scientific graphing and data analysis by the Origin software have been used for statistical analysis.

Results. The problem of development and implementation of specialized research techniques for monitoring research and identifying of risk groups has been developed. The motor activity of 10th grade schoolchildren has been analyzed, and the overall index has been calculated. The detailed statistical analysis of motor activity of respondents of different sex has been done. The girls who live in cities have the low indices of motor activity. High indices of motor activity for only a third of boys and one-tenth of the girls have been presented.

Novelty. International methods and protocols for researching of motor activity have been improved, and standard ratios for Ukrainian population have been proposed.

The practical significance. The proposed statistical approaches can be used for identifying of risk groups among children and youth.

UDC 539.3

PECULIARITIES OF REFINED SOLUTION OF A BEAM STRESS STATE WITH A LONGITUDINAL CRACK

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Research methodology. A refined kinematic model has been used for horizontal and vertical displacements taking into account the cross shear deformation for solving the problem. The system of differential equations and the system of equations for boundary conditions have been obtained by the variational method of Lagrange. The solution of the system of differential equations has been obtained by the method of Euler. The system for boundary conditions has been solved numerically using the method of Cramer.

Results. The result satisfies conjugation conditions in the cross section at the edge of the crack integrally for normal stresses and accurately for displacement and shear stresses. There exist gaps in normal stresses for which the boundary conditions are satisfied integrally. The deviation of the stress-strain state from the physically substantiated character with a distance from the edge of the crack disappears.

Novelty. This result clearly reflects the stress-strain state of the beam, with the exception of the region near the edge of the crack, and agrees well with the known numerical solutions and experimental data.

The practical significance. The longitudinal interfacial cracks in beams and plates can significantly influence their strength, so you need a more complicated mathematical approach to the calculation of such structural elements compared with the defect-free. This study indicates that relatively simple approaches and methods which allow to get the general solution of the problem, well reflect the stress-strain state of such structures with the exception of a small area at the edge of the crack.