Shot report

USE OF ELECTRONIC AND MICROGRAPHIC TECHNOLOGIES FOR PROCESSING AND PRESERVATION OF THE INDUSTRIAL DOCUMENTATION

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The major role in realization of any production process belongs to design, technological, normative and technical, operation, repair and other industrial documentation. The loss of the specified industrial documents inevitably leads to the output termination.

Despite of the accepted industrial documentation preservation measures, there is always a risk of its irrevocable loss because of fires, technogenic accidents, natural disasters, acts of terrorism, military actions and other extreme situations.

To solve the problem of fast completion of the documentation necessary for manufacturing of the important for the state needs production, destroyed, damaged or physically inaccessible in conditions of wartime or extreme situations effectively is possible by means of preliminary creation and reliable preservation of an insurance fund of the industrial documentation.

The documentation insurance fund is a set of the sequential files of backup copiers of the documents made on compact carriers, kept in special storehouses providing their reliable protection from destruction and loss in conditions of extreme situations and wartime.

Proceeding from the predestination of the documentation insurance fund, the technological processes applied during its creation, preservation and use, should provide:

- the authentic compact long- term storage carrier record of the documentary information presented in the analog and digital form;
- the long-term preservation of the documentary information loss- and distortion-free;
- the high stability opposite external adverse influences;
- the high degree of protection from not authorized access, distortions and deliberate destruction of the documentary information;
- the stability of used technologies for a long period of time;
- the reliable and operative reproduction of the kept documentation loss- and distortion-free in any time interval from the moment of its being introduced into the insurance fund;
- the opportunity of remote telecommunication access to the insurance documentation kept.

The integrated (hybrid) electronic-micrographic industrial documentation processing and storage technologies meet the specified requirements most fully. The complex use of electronic (computer) and micrographic technologies allows to combine effectively the high stability and the long preservation reliability of backup copiers of the documents fixed (recorded) on microfilms in analog human readable form, with the opportunities of operative search, telecommunication access and reproduction of the documents transformed into digital (electronic) form, at various adverse factors of influences.

Basic provisions of electronic and micrographic processing technology, the insurance storage and the use of major industrial documentation, developed in the Scientific Research Institute of Reprography consist of the following:

1. To create industrial documentation insurance funds the following documents are to be subjected to electronic and micrographic processing:
   - the alphanumeric and graphic documents represented in black-and-white and color version on paper carriers;
   - the alphanumeric and graphic documents represented in black-and-white and color version in an electronic form on machine data carriers;
   - the documents containing computer (EDPM) programs and recorded on machine information carriers.
2. Backup copiers of all kinds of documents (excepting program ones) are made in the form of rolled 35 mm microfilms represented on

black-and-white silver-gelatin films with the optical resolution of 600-700 lines per mm. The specified microfilms provide complete safety of the documentary information within 100 and more years, have high stability opposite external adverse influences, do not allow to make not authorized changes and deliberate destruction of the information, can confirm legal validity of the authenticity of the information of the lost documents.

3. Backup copiers of the documents represented in black-and-white version on paper carriers, are made by means of their optical microfilming on highly resolving film-making cameras (microfilming devices).

4.Backup copiers of black-and-white alphanumeric and graphic documents represented in an electronic (digital) version on machine data carriers, are made by means of their computer microfilming on laser micrographic plotter (COM-system), having the optical resolution not less than 7,5 thousand pixels per inch. Thus, for computer microfilming of the complete set of documents from the files of electronic copies of separate documents on a computer an electronic version of a microfilm of the complete set of documents, which is then recorded in the alphanumeric and graphic form on a backup microfilm, is formed.

5. Backup copiers of colored documents represented on paper carriers, are made by means of their color-separated computer microfilming on black-and-white silver-gelatin films. For this purpose, colored documents are scanned with the resolution of 400-600 pixels per inch with the depth of each pixel scanning of 24 bits. Then the color-separating of the digital model of the colored document's image on 3 monochrome colored image models (red, green and blue) is carried out by means of program processing. The monochrome color-separated digital image document models are rasterized (transformed into the binary form) and are recorded by means of laser micrographic plotter (COM-system) on three frames of a black-and-white microfilm which as a whole represent the backup copier of the colored document stored distortion-free for many tens of years.

6. Backup copiers of the programs intended for the computer (EDPM) and delivered on machine data carriers, are made by means of their rerecording on high-quality optical disks which parameters meet the international standards ISO.

7. Microfilms of backup copiers of alphanumeric and graphic industrial documents, and also optical disks containing backup program copiers, are stored(kept) in special storehouses at the temperature of no more than 15 ℃ and relative humidity 50 ± 5 %.

8. The authorized access of users to necessary alphanumeric and graphic documents (complete sets of documents), kept in the insurance fund, is carried out by means of corresponding backup scanning (numbering) of microfilms containing the images of these documents and computer manufacturing of their full-size copies on paper carriers by means of wide format digital plotters.

Thus, the digital plotters' network connection with telecommunication circuits allows to carry out remote reception of documents' copies from the insurance fund.

. 9. The reproduction of colored documents' paper copies from color-separated black-and-white microfilms kept in the insurance fund, is carried out by means of 8-bit scanning of three frames of a microfilm with color-separated images of the document; the colored document's digital image restoration by means of computer combining of the three digital files received as a result of the color-separated microfilm's frames scanning and printing the restored colored document's digital image on a colored digital plotter.

The electronic and micrographic technologies given are approved in the ship-building industry enterprises' design and technological documentation, and also in the colored cartography documentation concerning special hydrogeology.

The Literature:

1. "Special features of dying away documents' microfilming", Bobylyov L.I., Danilkin F.A., Kotov V.V., "Successfulness of contemporary science" magazine, №12, 2003, Moscow, "Science Academy".

2. "Conceptual statements of the highly valued, unique and informationally significant

documents' information insurance of the Russian Federation's library fund, " Gavrilin A.P., collected reports of the jubilee Tenth Russian Library Association's Conference, St.-Petersburg, 2005.

3. The microfilm quality showings' estimation at affine image transformations", Gavrilin A.P., The Tula State University News, "Computer engineering, Information technologies, Control systems" series, №1, The Tula State University Publishing House, Tula, 2005.

4. "The spatial image spectrum with amplitude modulation", Gavrilin A.P., Larkin E.V., The Tula State University News, "Special Mechanical Engineering Problems" series, №8, The Tula State University Publishing House, Tula, 2005.

CLOSED BY FEEDBACK SYSTEMS THEORY'S PRINCIPLES

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In the material and physical nature the so called "feed back" phenomenon does not exist at all.. It is created artificially in automatic control systems (ACS) of technological processes. For the first time the method is given, that proves the society's and enterprises' economies possess own natural, negatively influencing, positive feedback.

The machine production started in 1765 [1] when a steam machine and the automatic water level controller in the boiler of that steam machine was invented by I.I. Polzunov for the first time. The industry, technological processes and, accordingly, the industry of automatic controolers, as it is impossible to conduct technological processes without them, were developing. Thus, at the end of the 19th century the theory of automatic control systems (ACS) [2] consisting of technological process and a controller developed. After the article of G.V.Shchipanov had been published, [3] contrary to the serious criticism, the theory of invariability in automatics appeared and, since 1958 up to 1982 (VI) All-Union Conferences on the theory of invariability of ACS were held every 4 years. Proportional (P) controllers described by the equation $\Delta c = -Cr x$, with Δc as the controller's outlet change, Cr - the controller's gain coefficient and Δx - the controlled variable change, were large-scale manufactured; proportional-integral (PI) controllers $\Delta c = - Cr(\Delta x + \int \Delta x dt)$; and proportional-integral-differential (PID) controllers $\Delta c = - Cr(\Delta x + \int \Delta x dt + dx/dt)$. The processes were described by linear differential equations. That is why both the controllers and the ACS theory were kept in frames of linear systems capable to work at load variation in the process by 6-8%. Left parts of the processes equations were composed on the experimental data, and the right ones were written in the form of the product f(t) [1]. In them, f(t) is so called "disturbance", being not to the point of the process equation on its functional structure, and [1] – is a unit function of the unknown origin as well. So, both the ACS theory and the controllers remained independent from the symbolic models of technological processes. As the technological processes were developing, the controllers capable to work at load variation up to 100% and a theory making possible to build an ACS on symbolic models of technological processes became required. For this it should have been defined what is what.

Logically, a technological process is a manufacturing process when one or more product streams influence some other one or ones. Thus, a technological process is an interaction of two or more product streams, where the first ones are the material and the second ones – influences on the material, the streams' characteristics being changed. From the controlling point of view the last become regulating parameters, and from mathematical point of view the material, thermal et al. balance equations are symbolic models. As the process outlet is connected with the controller's inlet, the controller's outlet is connected with the inlet of the process (control object), a closed system comes into being. When laid on paper, a previously unknown geometric configuration, called a "***nomogram***"* (pic.1), comes into being, with x – as the value of the circuit/process output parameter, a – the measuring instrument's gain coefficient, m – output values of the measuring system, b_i – the task's structure coefficients, n – the controller's input, u_1 – the controller's output values, f_1 –