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THE ISSUES OF CREATING A FORMALIZED MODEL OF THE TECHNICAL DOCUMENTATION

Summary: *The article presents the synthesis of a formalized form of integrated algorithms that perform similar technological functions one-party document management in the sector of railway automatics and telemechanics, taking into account peculiarities of their structure. The basic method of combining algorithms is the introduction of additional definitive logical conditions. The developed model provides a reduction in the number of occurrences of the same type operators and logical elements in an algorithmic description of the process of doing of order specifications.*

Keywords: *technical document management, maintenance of order specifications, formal methods and models, the combined algorithm, the synthesis of the combined algorithms.*

In connection with growth of volumes of construction and technical upgrading in the areas of high-speed traffic in front of the Uzbek Railways are reducing the time and cost of design, construction and pre-commissioning activities during commissioning of systems of railway automation and telemechanic (RAT).

In modern conditions, expanding the functionality of the new systems of RAT, growing volumes and quality of information provided by the systems of railway automatic equipment for traffic management, monitoring of train position and state of infrastructure. With further development of these systems, the design, the process of finding and Troubleshooting become more difficult; increases the number of subcontractors participating in the design, construction and the supply of instruments, constructs and components; lengthened periods of system validation at commissioning.

Unfortunately, when creating systems of RAT do not always use modern methods of design, organization of cooperation of involved organizations, quality control of work execution, automation, input and retrieve information. The result is more time for design, construction and commissioning of the systems, the overhead time, more difficult is the planning of a schedule for completion of the work, it is impossible to take timely corrective management decisions.

The solution to this situation is the establishment of an integrated monitoring and management of the design, construction, pussonal-electric works, supply of devices, materials and equipment, as well as analysis of the quality of work based on the electronic circulation of documentation.

The use of electronic documents [1] due to the increasing complexity of systems and, as a result, huge volume of transmitted and processed information. For example, the design check of electric centralization of station visual method without the use of technical means over time may be compared with the design period of the system. Thus, without the use of means of complex automation of processes of obtaining information and information exchange impossible to reduce the time and improve the efficiency of manufacturing operations.

The most effective solution of problems of automation can be achieved by formalizing and applying mathematical methods of optimization of the coordination of the processes of electronic document management of technical documentation, in particular the main part of the order specifications (DCS) to devices of railway automatics and telemechanics [2]. Control and order management equipment is a complete solution for working with specifications, management of orders and monitoring of order execution equipment for construction and capital repairs of systems of automatics and telemechanics.

Formal methods for representing a process used to analyze the properties of formal object model. Thus, the properties of object should be formalized in a mathematical model. Accordingly, for the application of formal methods describe the process of doing custom specs and to determine the composition and properties of the standard describe the reference, it is necessary to develop a formal scheme (FCS) descriptions of objects involved in the process DCS. A formalized scheme is a form that defines the composition and appearance of the original data and should allow description of the object sufficient to automate the process DCS [3].

FCS needs sufficiently generalized to describe a wide class of objects (specifications, instructions) and at the same time to ensure ease of procedures bound to a specific object. For this FCS should include a set of

presentation media elements, structures and algorithms of functioning of the system, functional and static dependencies between the parameters

For algorithmic display DCS is characterized by a large number of occurrences of the operators $O_p, p = \overline{1,P}$ and logical conditions $\alpha_k, k = \overline{1,K}$ in some private algorithms DCS $A_{q,g}$ with a relatively small number of types. In this connection it is expedient to set the task of reducing occurrences of similar operators and logical conditions (elements) in the algorithmic description of the process DCS. This problem is solved by combining algorithms $A_{q,g}$, performing the similar technological functions one participant in the workflow.

Consider a problem of synthesis of the joint algorithm DCS (A_o) in a formalized manner. DCS described by a set of algorithms A_g. Each specification is processed, the whole set of algorithms $A_g, g = \overline{1,G}$, a formal entry which is implemented on parallel logic algorithms using the symbols introduced above.

When combining algorithms DCS be aware that after you perform any O_p in various algorithms $A_{q,g}$ can execute different sequences of elements.

To determine the order of the elements in the combined algorithm $A_{o(q,g)}$ introduced additional definitive logical conditions (DLC) – $r_\mu, \mu = \overline{1,M}$. DLC r_μ are put at the A_o after the O_p element and form a tree of controls (Fig.1), the number of outputs which is equal to the number of different elements running at different A_g after O_p.
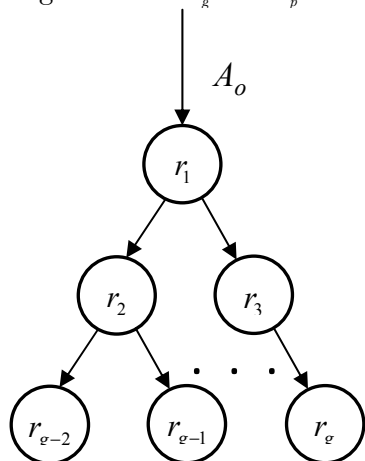

Fig.1. The tree shaped structure checks

Index g private algorithm determines the element that is to be executed in the algorithm $A_{o(q,g)}$, after the O_p element and, therefore, DLC represent a Boolean function from the indices of the algorithms is $f(g)$. To write such functions are introduced Boolean variables of the form:.

$$x_J = \begin{cases} 1 \ if \ \ g = G \\ 0 \ if \ \ g \neq G \end{cases};$$

$$x_2 = \begin{cases} 1 \ if \ \ g = 2 \\ 0 \ if \ \ g \neq 2 \end{cases}; \dots$$

$$x_J = \begin{cases} 1 \ if \ \ g = G \\ 0 \ if \ \ g \neq G \end{cases}$$

Then the function $f(x_g) = f(g)$, and DLC is:

$$r_\mu = \begin{cases} 1 \ if \ f(x_g) = 1 \\ 0 \ if \ f(x_g) \neq 1 \end{cases}$$

We introduce a definition. The combined algorithm is called DCS $A_{o(q,g)}$ that meets the following criteria:

– any element of the alphabet of the description $A_{qg}, g = \overline{1,G}$ included in A_o and that only once;

– if $A_{o(q,g)}$, including DLC, to substitute in the function $f(x_g)$ the specific value of g, the sequence of elements corresponds to $A_{q,g}$.

Thus, the task of combining algorithms is DCS synthesis algorithm A_o that meet the conditions specified.

The basis of the proposed method of combining algorithms is analiz properties of partitions π_J on the set $A_{q,g} \in A_i, g = \overline{1,G}$ of the combining algorithms to determine the number, placement DLC $r_\mu, \mu = \overline{1,M}$ in $A_{o(q,g)}$ and the composition $f(x_g)$ for each $r_\mu, \mu = \overline{1,M}$.

The proposed method allows to solve the problem of combining algorithms DCS taking into account peculiarities of their structure. By using the combining algorithms is achieved by reducing the number of occurrences of elements in A_o due to the introduction of additional logical conditions.

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