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Designing of Information Model of Mines

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ABSTRACT: Examination of modern conditions of a process of simulation of separated systems (mines) shows that received results broadened our theoretical knowledge and were useful in designing. But they don't give full insight about behaviour of systems as integrity structure. In this connection it is necessary to carry out system-information examination of particular systems which will allow creating of model of ventilation system of a mine as an integral structure. For this reason, creating of information that supports the computer-aided models of conditions of mines' ventilation (CAM CMV) is necessary, which are constantly in operation. CAM CMV systems are sub-systems of systems of higher level, where information is received related to objects of mining production.

I INTRODUCTION

In process of working out in detail requirements to system of computer-aided models (CAM), a problem arises of designing of data base structures they include. The most important stage of this problem solving is information simulation of application domain. Information models are interface facilities between different categories of users and designers of the system. That is why, as a rule, they are worked out ignoring characteristic properties of physical representation of data.

2 DETAILS OF THE PROBLEM

Designing of information model is a multi-stage interactive process including design and identification of objects, determination and description of their properties; separation and description of relations; analysis of the model for fullness, redundancy and inconsistency; and its reduction to canonical form.

Designing of objects is carried out according to hierarchical principle by a way of step-by-step decomposition of complex objects into simpler ones. Detailing is carried out up to separation of classes of objects, which will henceforth study as elementary objects. Functions of computer-aided models of conditions of mines ventilation, which are typical of CAM, allow carrying out of designing of models of complex ventilation system from a set of elementary domains, air losses and designing of schemes of solving of problems of heat-mass transfer by means of a set of basis operations. Structure of CAM CMV is formed as informational-logical system and includes data banks, procedures, command processor and system of control of process of simulation. Data bank is intended for storing computer models of ventilation objects, numerical models of their schemes, aerodynamic parameters and archive information. Description of definitions of problems, separate sub-systems, from which graph of problems solving is designed, is carried out on formalized language. System of control of a process of simulation implements of users requests, plans and coordinates operation of other components. Command processor is a source of exchange of information between users and CAM CMV.

In a process of solving of problems, interconnection of adjacent ventilation levels is taken into consideration by a way of air moving through zones of caving, interaction with surface ventilation equipment and also interaction with surface zones of caving, which extend immediately to air workings and main workings. There is a possibility of imitation of ventilation equipment in adequate regime: districts, where mining operations are being carried out,' and zones of cavings in filtration regime of air moving from day surface into a mine at the expense of pressure differential. And as a base, aerodynamic scheme of ventilation of any objects (mines) with all their technological and technical parameters is taken. For implementation of so wide functional opportunities besides powerful software, statistical and mathematical apparatus working

group is formed including specialists on mine ventilation, mine workers, programmers, mathematicians and physicists. This group carries out preparing and entering information into system, maintaining of data banks and procedures in a satisfactory state of operation, solving the system subject problems together with external users, evaluation and analysis of their results. One of the important

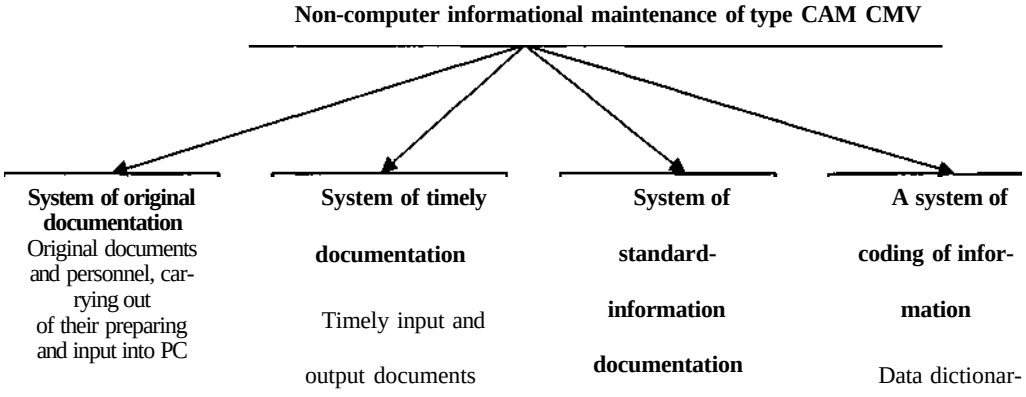

Figure 1. Structure of non-computer informational maintenance of type CAM CMV

problems of the working group is development and improvement of methods of problems solving, technology and exploiting of computer-aided models of conditions of mines' ventilation.

The foregoing information gives a common insight into the mathematical and organizing-methodical maintenance of the system. Now we will present characteristic properties of its information maintenance. In Figure 1 a structure is presented of non-computer informational maintenance of type CAM CMV. As seen, a system of original documentation includes input graphical and text documents, used for creation and identifying of model and personnel, carrying out of their control, record-keeping and monitoring, preparing and loading them into PC.

A system of timely information includes input and output documents, which are used in a process of a model operation for its revision and correction, description of solving problems. Output timely documents include results of problems decisions and also information about data, holding in a system. A system of standard information documentation defines sequence of development and function of CAM. The system's designer carries out entering, accumulating and applying changes for it in consultation with the working group. A system of coding is a set of data dictionaries. A special staff carries out their management and replenishing.

So, non-computer informational maintenance of type CAM CMV forms data, which are presented as graphical and text documents using or forming in a process of the system operation (non-computer

information base). Administrative group carries out maintenance of the information base.

3 CONCLUSION

As seen, CAM CMV will ensure forming and solving of direct and reverse problems of simulation and also forecast control of conditions of ventilation regime of mines. Now, creation of three-dimensional models is provided for three-dimensional simulation of complex situations.