The information analysis system for controlling the maintenance conditions of railway objects

Valery Kruglov, Vladimir Solovyev, Alexander Zenin

Abstract: It's impossible to make a timely decision about conducting the works concerned with the modernization of engineering structures and/or setting the operational conditions without having reliable information about the construction and technical state of these engineering structures. Such an IAS has been designed and deployed at the managing and line organizations concerned with operation of autoroads and railways in Russia. The principles of its organization are discussed in the paper.

Key words: engineering structures modernization, operational conditions, information analysis system, control, decision making, railway operation safety.

It's impossible to make a timely decision about conducting the works concerned with the modernization of engineering structures and/or setting the operational conditions without having reliable information about the construction and technical state of these engineering structures. The problem of obtaining, maintaining and providing real-time access to such information emerges and making decisions on the basis of analytical calculations. In order to solve these issues fast a multifunctional information analysis system (IAS) is required for controlling the maintenance conditions of engineering structures on autoroads and railways.

The main goal of designing and deploying the IAS is to ensure safe railway operation and increase efficiency of investment through the deployment of new information technologies, increasing reliability of data about engineering structures, and carrying out analytical researches. Such an IAS for controlling the maintenance conditions of engineering structures on autoroads and railways has been designed and deployed at the managing and line organizations concerned with operation of autoroads and railways in Russia.

The decision making process involves collecting statistical information, preparing datasheets, workflow automation, engineer computations automation (classification of spans and supports by capacity), determining the conditions for driving the rolling stock over bridges, score assessment of engineering structures.

Prof.Dr.sc. Valery Kruglov (kruglov@miit.ru), Prof. Dr. Vladimir Solovyev (solowjow@online.ru), Prof. Dr. Alexander Zenin 15, Obraztsova str., MIIT, 127994, Moscow, Russia.
The IAS includes a database and software that contain the following main modules:

* input, viewing and editing data about the construction of engineering structures
* input, viewing and editing data about the flaws in bridges and pipes
* generating standard report forms from data about bridges and pipes
* assessment of the technical conditions of engineering structures based on reliability theory parameters
* determining the conditions for driving the rolling stock over bridges
* preparing standard report forms and custom report forms
* calculating aggregative costs of engineering structures maintaining and modernization taking into account their actual technical state
* planning modernization works
* information inquiry system on typical bridges and pipes construction
* universal information inquiry system

The structure of the engineering structures database was specified by the list of parameters defined in the standard report forms used at railway and autoroad transport companies in Russia.

All subsystems included in the IAS based on the following principles:

* use of the single database working under control of DBMS
* designing and implementing the software system based on client server networking technologies
* sharing the single normative inquiry information by all the subsystems

Prof. Dr. sc. Valery Kruglov (kruglov@miit.ru), Prof. Dr. Vladimir Solovyev (solowjow@online.ru), Prof. Dr. Alexander Zenin 15, Obraztsova str., MIIT, 127994, Moscow, Russia