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Multimedia technologies in complex for education and automation control

ABSTRACT

The person in the life time passes stages of education, theoretical tutoring, practical and psychological training, certification etc. For this purpose except a traditional methods today even more are using: computer presentations, training programs, models of parametrical functions etc.

The main purpose of these researches is creation the methodology of compositing of professional education and technical control in the unified program environment. The new approach to modeling at which the model includes descriptions of a plenty visual, acoustic, parametrical, operational and other attributes of the equipment is developed, also the personnel skills are taken into description. The software of a complex is under construction on multimedia-technologies and allows to unite these descriptions for carrying out of training and supervising actions.

For the coordination of the methodology tools there are developed a special algorithms.

One of industrial branches where interactions the person and the machine are most important is electric power industry. This is very dangerous and responsible manufacture. Very rigid demands here are made to knowledge of the personnel. It is necessary to note, that the majority of large failures on power supply systems occurs because personnel mistakes in an estimation of a situation. The reasons of Chernobyl accident, infringement of power supply at East coast USA, the Moscow failure in May, 2005 are those.

Failures because of refusal or deterioration of technics are not less tragic. Steam pipelines of a high pressure are very dangerous in this respect. At occurrence of emergencies on pipelines there is a stop of power stations, there is a threat of a people life. Control of power supply systems under the traditional scheme is very combined, demands long time, wide experience, and, nevertheless, leads to inevitable mistakes.

Theme of my researches is development of multimedia programs for the control of a metal condition in steampower equipment, maintenance of their reliable operation and training of the supervising personnel. Researches are spent under the plan and at methodical support of the Power Repair Enterprise (Novocherkassk) and JSC "RostovEnergo" (Rostov-on-Don), entering in Russian Open Society " UES of Russia ".

Today the control of metal in thick-walled steam pipelines under high pressure is carried out

under the traditional scheme. The equipment owner will organize the account of a temperature operating mode of metal and processing of daily schedules of temperature pair on each boiler and in steam lines. Records about terms of carrying out of tests are on a regular basis supervised. In scheduled terms the cut of metal which analyzed in laboratory is done. The equipment is considered suitable to the further operation if the condition of the core metal meets the requirements of the normative documentation. After ending of the equipment park resource it is supposed to the further operation only at positive results of diagnostics.

Now for the control following methods are used:

- The visual control, - is observed character of a metal surface and welded seams, the kind is compared to images in a picture album, the condition is estimated under descriptions applied on a photo;

- The color control getting substances, - a metal color is defined by a control photo a condition of metal;

- The ultrasonic control, - latent defects of metal are detected by the special devices displaying internal cracks by the reflected ultrasonic signal;

- Ultrasonic thick measurement, - thickness of the metal subject to loss of normative thickness and others is similarly measured.

Data of these researches are reduced in standard tables, forms and schedules. Data are stored in the paper archives, access to them becomes complicated because an absence of a control system of documents. For data processing typical instructions which represent special editions - also on paper carriers are used.

The personnel is trained in work with control devices and the documentation at lectures and laboratory researches without of computer applications.

It is offered to create for increase of the control efficiency the Complex of multimedia programs to unite the engineering specifications on CD, analytical program blocks and a training course.

The primary direction of a complex is decrease the risk of emergencies and precisely to predict time of next equipment repair.

The program contains analytical and visual sections which include interactive schemes of steam lines, graphic representations of metal microstructures and the basic macrocells with their characteristics. To each controllable element the built in timer counting term of its life is appropriated. The program conducts automatic protocol of an object condition, notifies the personnel on necessity of repair, transfers messages to heads of laboratories and the higher organizations.

Two modes - working and educational are programmed.

The training part as much as possible repeats a working part and includes:

1. Animated schemes of various objects of the control.

2. The fact-finding information on a quality monitoring. A quality monitoring are represented in the form of rules, illustrations, schemes and the examples having sound and visual support.

3. An educational set. The program offers the student the concrete scheme with the certain current parameters, a set of a possible quality monitoring. Accidents are simulated. Comparison of results of researches with archival samples is spent. The conclusion about a condition of object is done. Instant decisions are offered on a choice. The estimation of reaction of the student is given.

The Multimedia system of training influences the various centers of human memory, that considerably raises efficiency of process of training. Very important role in a training course is played the visualization: the graphic information allows to present evidently process or experiment, to include in the block of training video fragments showing performance of the control stages. Some processes are illustrated by bidimensional or three-dimensional animated schemes.

The main feature of a training part is use during training the same supply with information, as in the real control. The student is as though supposed to real object immediately, right at the beginning of employment.

The program complex is created in the uniform soft. Multimedia-problems are solved means at FLASH-MX ' 2004 Professional. Management and the analytical block is realized in language ActionScript II. Graphic fullscreen images are coded in format JPG; a sound in mp3; video in MPEG-4. The exchange on channels Client - Server is provided with subroutines XML-Socket.

The user modules are created in format SWF (ShockWaveFlash) under control of central module FlashProjector.exe.

The important feature of such software set is high security from not authorized access and immunity to known types of viruses.

Application of the offered technique under forecasts of power branch experts will allow to prolong essentially terms of operation of greater pipelines, to achieve money economy, to raise safety of power complexes. The system considerably will lower loading on the lab personnel, allows to connect the removed power objects and the control organization, to train young experts.

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