

1.8.20. VIBRATION DIAGNOSTIC CONTROL AS THE COMPONENT OF THE CONTROL SYSTEM OF PROFESSIONAL RISKS

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Introduction. It is known, that professional risks are one of versions of technogenic risks. Thus the prevention of extreme situations of natural and technogenic character (incidents, failures, accidents, etc.) is possible by application of methods and means of non-destructive testing and diagnostics (NDT&D) in the most different areas of a life.

Work is devoted to development and improvement of the power equipment vibration diagnostic control methods as to a component of a control system of professional risks [1 – 5].

The basic results. Application of methods and means of the control and diagnostics in a general sense allows to provide national safety in various areas of ability to live. On fig. 1 the scheme of their interrelation is presented. Thus the practice of various areas of ability to live shows, what the world in which we live, it is the world of vibration (i.e. all is vibration). Hence, the analysis and synthesis of laws of vibrating processes allows to solve the basic purposes and problems of recognition of a condition of various areas of ability to live.

In the countries of the European Union the estimation of a professional risk is obligatory. In Russia a basis of a control system of professional risks is continuous certification of workplaces on working conditions, namely – an estimation of working conditions on each workplace with a view of revealing harmful and-or dangerous production factors and realization of actions on reduction of the working conditions conformity with the state normative requirements of a labour safety [1, 4].

Thus in a control system of professional risks the major place belongs to application of modern methods and means of the control and diagnostics of a condition of workers, the workplaces, the maintained core and auxiliaries of power objects in a cycle “Designing – manufacturing – operation – reconstruction”, as decrease in a level of professional risks can be reached, first of all, by means of actions on their diagnostic control.

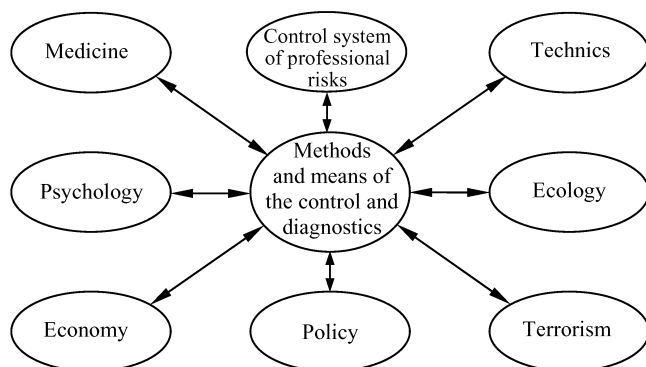


Fig. 1. The scheme of interrelation of methods and means of the control and diagnostics with various areas of ability to live

Today the main scientific direction of NDT&D – it is development of new physical, physical and chemical methods, ways and devices of diagnosing of parameters, development of means of instrument making and automation, processing of the information with a problem of definition of a residual resource of potentially dangerous objects and risk of their operation [5].

Thus vibration diagnostic control of arising defects is very important direction in diagnostics of the equipment as detection of damages at an early stage of their development provides prevention of sudden refusals, transition to operation and maintenance service of the equipment on an actual condition, data acquisition for forecasting a residual service life.

The majority of methods of diagnosing of arising defects of the equipment have in the basis following diagnostic model:

- development of defect causes in a vibrating signal growth of number and amplitude of short-term emissions of a signal of type of shock impulses;
- shock impulses modulate oscillations on forced and natural frequencies of the equipment.

The problem consists in finding an optimum method of processing of a signal for allocation of the information on development of the damage, reducing to a minimum influence of handicaps and allowing unequivocally to correlate the received characteristic of a signal with a kind of defect.

For this purpose the vibration diagnostic control method of the power equipment over parameters of sensitivity of units to influences raising vibration is offered. The given method provides calculation of spectral portraits of objects of diagnosing, including, by means of system of computer algebra of kinematic and dynamic researches of machines and mechanisms (SCA KIDYM) [2, 3].

Discussion of results. The method of recognition of arising defects of machines (as a component of a control system of professional risks), based is offered on: deep preliminary studying of object of diagnosing, construction mechanical (electric-, hydraulic-, mechanical) and mathematical models of object, theoretical calculation of its spectral portrait.

The developed method deepens process of diagnosing of objects by construction of aprioristic basis of system of technical diagnostics (calculation of a spectral portrait) and can be applied together with a method of the analysis bending around a vibrating signal on resonant frequencies of the mechanism, dimensionless “S-discriminants”.

Reliability of the offered method is confirmed by conformity of the basic scientific positions and conclusions with experimental results at diagnosing the core and auxiliaries of power objects.

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