

APPLICATION OF MATHEMATICAL MODELING APPROACH IN THE EXTENDED PROFESSIONAL EDUCATION

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The modern development of the system of extended professional education (EPE) is impossible without enhancement and development of practice of creation of reference and didactic materials, electronic (multimedia) textbooks as a methodical and informational support to the educational programs. Teaching in the frameworks of EPE is to be carried out with the intensive methods provided for the active work of students and to come along with recommendations on using software to solve the specific problems of each individual user. The main position in this program is taken by the IT based on the Internet with application of mathematical modeling. Preeminently due to them the relatively complex physical phenomena and processes in technical systems are being visualized.

Tomsk Polytechnic University is involved in making electronic textbooks (ET) and electronic teaching and methodic complexes (ETMC) based on the method of mathematic modeling and directed to be used in EPE. The developed program products make it possible to receive deep knowledge in a subject and they are targeted on comprehension and analysis of knowledge got during the retraining process, which is very essential for professional activity.

However, the successful use of mathematical modeling approach requires theoretical knowledge and skills to assign and accomplish an applied task arising in the specific subject area. Besides, special consideration should be given to practical work directed to acquire stable skills of working with PC.

If traditional methodological principle of teaching based on the extensive knowledge accumulation makes it possible to acquire theoretical knowledge in some measure, than this principle does not train to get the skills to assign and accomplish the applied task. ET, developed on the basis of traditional principals

of didactics, mainly do not meet the requirements both of a trainee and a teacher, especially when the time consumption should be minimal and the training level – maximal.

ET and ETMC created with application of mathematic modeling approach allow eliminating a number of such shortcomings. They have the advantages over traditional technologies as deep elaboration of knowledge in fundamental disciplines of a technical higher education institute (physics, mathematics, electric engineering), interconnection between the disciplines, possibility of monitoring of the outcomes of teaching the trainees within the whole period of training, dialogue between a trainee and a teacher.

The structure of a course, based on the mathematical modeling can conditionally be divided into two constituents. The first deals with the disciplines of basic technical profile; and the second concerns a specific direction or specialty of retraining. Each of the constituents is supplied with the supplementary test material. Tests of the first constituent are directed at checking the level of knowledge and understanding of the material. In order to check the knowledge in the second constituent of the course, the testing system should be developed, which could make it possible to assess the skills on modeling the processes of complex technical systems.

While creating ET and ETMC, it is important to understand the context and sense of each particular course (discipline), which task in training a specialist it accomplishes and how to base these issues on the mathematical modeling approach. To put it differently, mathematical modeling makes it possible to perform the functions of the basis for a system approach in technical education.

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