

IT, principles of automation, including computer programming skills – this is the third discipline module. Another important aspect of this programme is developing competencies, i.e. in-depth understanding of technical knowledge, domestic and/or foreign experience pertinent to the engineering discipline through courseware, science literature and journals. To accomplish this, integrated methodology and English language learning are included – fourth education module. **Integrated methodology includes three English learning levels- basic (1-2 courses), university component (3 course) and teaching engineering disciplines in English (3-4 courses).** After completing the Bachelor degree programme students would have the opportunity to continue their education in

Master degree engineering programmes in any university abroad.

Thus, innovative engineering education programme includes four professional-oriented modules: **mechanics, fundamental-professional, modeling and programming, and communicative.**

The implementation of the proposed innovative programme enables a student to enter any engineering Master degree programme after completing the Bachelor degree programme. The basic innovative education programme provides universal, diverse, fundamental and basic engineering education in effective modeling of different linking system mechanisms. This advanced education major would boost the development of innovative engineering education within North Eastern Federal University in Yakutsk.

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Humanities and Social Technologies to Develop Engineer's Personal Potential in Self-Developing University Environment

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Techno-humanitarian balance conditions the prospects of human survival as well as competitiveness of Russian industry on the global market. This balance depends strongly on such engineers' qualities as way of thinking, ethical priorities and reflexive positioning. The paper describes a practice-oriented approach to study personal potential of modern engineers, development of their personal qualities by means of socio-humanitarian technologies and reflexive approach used in educational process.

Key words: socio-humanitarian technologies, engineer's personal potential, reflexive management, self-developing environment of higher education institution.

The engineer of the 21st century is a key figure in social and economic space of modern Russia headed for technical and technological breakthrough in science and industry, import substitution, upgrade of engineering education. The vector of thinking, ethical priorities, reflexive position of a future engineer influence today the choice of techno and humanitarian balance both as a condition of survival and prospects of mankind, and as a solution of the local problem of competitiveness of the Russian industry in the world market. The dialogue of natural-science, technical and technological, and humanitarian thinking, logic of interrelation of professional and socio-humanistic knowledge and experience, personal potential of the engineer, their implementation in engineering practice is set by the order and nature of the acquired knowledge to meet challenges of fast transformation in social and technological practices and actual trends of an engineering profession; they serve as prerequisites of the solution of this fundamental problem. Today highly specialized training of the engineer with a dominant of engineering intelligence under «laboratory conditions» of acquiring

knowledge and experience becomes insufficient for adaptability to new types of knowledge, change of the purposes and means, ethical priorities, activities in professional practice.

Professionalizing and personal qualities of a modern specialist in general depend on methodology and effective technologies of his education and transfer of professional knowledge in engineering practice. The relevance of research in personal potential formation modality of the engineer of the 21st century and opportunities of its reflexive provision in modern Russian higher education is caused by a block of theoretical and practical factors. The first one is the essence of reasons, certificates of theoretical knowledge as a development of socio-humanistic technology in the self-developing environment of higher education institution, formation of personal potential of the engineer, relevant to modern social and economic requirements with a high level of creative engineering thinking, presenting professional socialization, a set of professional abilities, personal resources, values. The second block considers a problem of transfer, implantation of educational experience of the 21st century



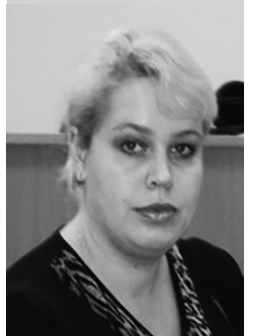
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engineer personal potential formation to the interval of innovative processes in current and future professional practices. Fast aging of engineering personnel, change of its quality structure, outflow of young qualified specialists from the specified areas to other spheres of social activities are observed. This circumstance does not allow meeting social and technical and technological challenges of the present time – competitiveness of an engineering product in the sphere of high technologies, systemically reproducing and hiring the engineering personnel with the adequate complex of competences that are transformed due to social and economic practices and allows performing engineering, research, socially important functions in the mode of «society of knowledge», «heuristically» (reflexively) and taking professional decisions. Therefore, the problem solving of young engineering and research personnel deficit prepared for effective professional activity under the conditions of constant practices transformation in the sector of production, science and higher education becomes a priority task of the Russian science, education, and industry.

The methodology of professional training of the future engineer has to be guided by basics of modern philosophy of science and technology, principles of post-nonclassical rationality and interdisciplinarity [3, p. 20-25] correlated with the environmental paradigm of the human self-developing systems [1, p. 7-13], ethics of self-developing reflexive and active environments [2, p. 46-50]. Such a methodology of training demands personal potential formation by means of socio-humanistic technologies in the self-developing environment of higher education institution.

The tools of post-nonclassical methodology are for the first time approved in our practice-project approach to preparation of engineering personnel; the key components of personal potential of the engineer are commensurated with the

self-developing environment of higher education institution, reflexive activity at the three stages of higher education (a bachelor degree, master course, postgraduate study) and engineering practice. Theoretically, the research serves for expansion of socio-humanistic paradigm in professional engineering education, a concept of «the personal potential of the engineer», and also for determination of constellation features of prepotent personal qualities of the engineer, relevant to the self-developing environment of higher education institution. Scientific knowledge growth implies development of engineering personnel training model by means of the socio-humanistic reflexive technology converging personal, professional competences and ethical priorities of the engineer which corresponds to the role of engineering education, modern trends of engineering practice development, tasks of global competitiveness of the Russian industry. The scientific and applied project results in development and implementation of information model of the self-developing environment of higher education institution with disclosure of the purpose of all the subjects of engineering personnel training, designing of «subjects assembly» and implementation of the project practices in the three-stage educational space of technical higher education institution and engineering practice to develop of personal and professional resources, unite engineering mentality of the 21st century.

Our project of engineering personnel training is initiated due to the following problem. The issues of the law of techno and humanitarian balance violation of the anthropogenous crisis which is initiated by technical and technological intervention at the beginning of the 21st century are widely discussed in the sphere of humanitarian knowledge and science today. The current situation with the consequences, unpredictable for mankind, may be partly overcome by solving the fundamental problem of natural-science and humanitarian paradigms dialogue via

understanding the prospects of mankind survival, harmonization of technically oriented engineering intelligence and humanitarian and reflexive mentality based on anthropological, social, and ecological values. The solution of these problems is strongly connected with the issue of engineering personnel training meeting the purposes and standards of domestic engineering product competitiveness in world economy and industry. In its turn, it actualizes the research of methodological tools for analysis of the engineer of the 21st century, constellation of personal and professionally important qualities of the engineer, diagnostics of special knowledge measure and socio-humanistic, reflexive experience in the self-developing environment of higher education institution. The self-developing environment of higher education institution means interaction of all subjects of the engineer professional training (higher education institution, engineering practice (enterprises, business community) on the basis of consistency in the purposes of engineering ethics, reflexivity and all subjects assembly, organization of communicative space, which initiate project identification of engineering mission. The construct of personal potential developed in domestic philosophy, socio-humanistic science by means of reflexive technologies can be helpful to explain the «basket» and dynamics of the professional personality characteristics commensurability of engineering competences and engineering practice challenges [4, p. 8]. The personal potential of the engineer is considered as a generalized (personal, subject, cognitive) opportunity for self-determination, self-development, self-management in the professional and social environment [5, p. 32-36]. Such interdependent variables as the developed reflexive activity, autonomy (self-determination), creative activity, project identification, responsibility, trust, communicative capabilities, which are most brightly demonstrated in the «nonlinear» professional situations are implicit for the

construct of personal potential.

Professional activity of the engineer in modern life is accompanied by fast transformation of social and technological practices. This circumstance initiates cognitive flexibility and accelerated adaptability to new types of knowledge, change in the purposes and means, ethical priorities of activities, and also meets the two complementary purposes of education: first, orientation of training process to extremely broad development of the person and formation of personal qualities, secondly, discovery of individual opportunities for permanent cognitive search and maintenance of high level professionalism. Achievement of the specified purposes seems probable in case of reproduction of such educational and cultural invariants in training process of the engineer, which provide world outlook and methodological depth for the ordered process of fast and high-quality learning (through reflexive and critical review) of the most different cultural and technological innovations, and also initiate a synergy of natural-science, technical and humanitarian mentality, priorities of engineering ethics. This reproduction is set by the tools of post-nonclassical rationality, interdisciplinary paradigm by means of the reflexive technologies creating a fundamental basis for perception and translation of any sociocultural and professional models, values of world cultural development.

As a result, the main objective of the project is to develop a socio-humanistic technology of personal potential formation of the engineer in the self-developing environment of higher education institution, to study systematically the main components of the engineer personal potential, features of its constellation in the educational process and engineering practice with complementary definition of possible mechanisms of reflexive impact on this process. Aggregation of the «basket» of competences of the future Russian engineers, determination of knowledge

priority will be directed to development of the model of engineers' professional training converging personal and professional competences, professional identification in the self-developing environment of higher education institution. The self-developing

environment of higher education institution may be identified as creation of its information model with disclosure of all subjects of engineering personnel training, project of «subjects assembly».

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Issues of Fostering Students' Artistic Taste in the Process of Engineering Education

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The article justifies the need to develop such personal skills of future engineers, as the artistic taste, the sense of beauty, and the inner personal culture. The basic requirements towards mechanical components, connection joints and structures are addressed allowing the creation of not only technically ingenious, but also eye-catching products that would be notable for their harmonic configuration and beauty. Special emphases are put on the phenomenon of golden ratio, inherent to the most attractive and beautiful items created by nature or by human.

Key words: artistic taste, aesthetic culture, visual appeal, expression, beauty, golden ratio.

Owing to the modern rapid development of science and technology there is a possibility of an occurring tendency towards lower requirements for the artistic taste of an engineer with respect to his/her engineering decisions. This may lead to the decrease of the aesthetic qualities of developed items. Finding successful solutions to modern issues of new technical systems' design is only possible in the case of increasing inner aesthetic culture of engineers.

It may seem at the first glance that issues of aesthetics, that need to be solved by a technical specialist, could be handed over to designers or application-oriented artists. However the practice indicates that these specialists, who lack basic engineering knowledge and engineering support, are not capable of creating aesthetically ingenious technical systems [1]. On the other hand, in case if such specialists do not have an opportunity to get direct involvement in the design and development of technical products, engineers are required to take over their functions. Therefore, an engineer has to be specifically trained to conduct these tasks, as well as to be ready to cooperate with professional designers.

As a result higher education institutions have an arising need for sufficient

enhancement of engineers' aesthetic culture.

In order to enhance aesthetic education of mechanical engineering students it is necessary to emphasize and demonstrate the most relevant, highly ingenious and beautiful technical decisions within the teaching process of basic engineering and specific professional courses. Such demonstration of technical items' beauty standards with relevant comments would form and foster students' taste and sense of beauty in the field of technology. Besides, this would assure the most efficient and solid understanding and acquisition of study material, since it would be obtained via two channels simultaneously – through the thoughts and logical thinking and through the feelings.

Thus, when designing new mechanical products it is necessary to ensure not only the technical excellence (that is the main indicator of product's quality), but also the coinciding appearance, its visual attractiveness. Advertised technical excellence of a product would be acknowledged only in the process of its exploitation, but the external appeal of a product, reflected in a showpiece or on a picture in the company's catalog would, in no doubt, affect the customer's decision on



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