

# Professional competences necessary for the bachelor-degree-holding engineer specialising in engineering industries

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## Abstract

Considering the requirements of technical university graduates (communicative readiness, creativity, positive relation to the profession, methods of the technical and economic analysis, etc.), the notion of professional competence, based on the federal educational standards and data from the interviewing industrial employees, is highlighted as one of the professional skills required of a bachelor-degree-holding engineer working in the engineering industries.

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*Keywords:* Professional competence; Basic skills; Professional skills

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## Introduction

World society and professional public organisations actively work in the field of ideology, methodology, methods and practice of engineering education. As a result, the requirements of the graduate have been formulated, along with the major factors defining the graduate's level of preparation.

The requirements of the engineer of the XXI century include the following aspects:

1) Professional competence — a combination of theoretical knowledge and practical readiness of

the graduate, the ability to perform all types of professional activity is determined by the educational standard in the direction or the specialty of preparation;

- 2) Communicative readiness — literary and business writing skills and oral language fluency in their native language, as well as knowledge of at least one of the most popular foreign languages in the world; the ability to develop technical documentation and use it; the ability to use computers and other communication and information, including telecommunications networks; knowledge of psychology and the ethics of business communication; possession of the skills required to manage a professional group or team;
- 3) The developed ability to use creative approaches to arrive at the solutions of professional tasks; the ability to be guided in non-standard conditions and

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- to develop a plan of action; readiness for implementation of the plan and responsibility for its implementation;
- 4) A steady, conscious, and positive relationship with the profession; aspiration for continuous improvement;
  - 5) Knowledge of the methods of the technical and economic analysis of production for the purpose of its rationalisation, optimisation and renovation and the methods of ecologically ensuring production and engineering environmental protection measures;
  - 6) Knowledge of methods of modelling, forecasting, and design and methods of performing research and the relevant tests required for creation of intellectual property and material production;
  - 7) Understanding the tendencies and the main directions of the development of science and industry [1].

The methodology of the optimum development of the requirements of a graduate of an engineering higher education institution consists not only in the accounting of the approaches and views of the spheres of higher education and the professional activity of the expert, including the common and peculiar features of the modern technology worker, but also in the accounting of all communications of the identity of the professional with society, the environment and the professional sphere. Such communications are basic, focussing on the formulation of the requirements for the programs of higher technical education and for implementation of the educational standards of vocational training.

### **Professional competence of bachelor-degree holding engineer**

The basis for an expert assessment of the educational quality are the achievement of the state requirements regarding the adequate educational content and the level of training of the graduates who have mastered one of the programs of the higher technical education.

After the accession of Russia to the Bologna declaration on September 19, 2003, Russia had the task of integrating its educational system into the European Higher Education system. This new stage in the modernisation of the Russian education system involves the formation of professional competences of future experts using a competence-based approach.

Many domestic scientists (A.L. Andreyev, V.I. Baydenko, E.S. Zair-Bek, I.A. Zimnyaya, G.K. Selevko, Y.G. Tatur, A.P. Tryapitsyna, A.V. Hutorskoy and others) are paying attention to the development of the concept of “competence”. Given a set of definitions of the concept, with each of them having different characteristics, we cannot state that a clear understanding of “competence” exists.

After analysing the available literature for the determination of the term competence, we believe that the concept of competence can be divided into three categories. The first category considers the role of competence in terms of personal characteristics (ability, creativity, perseverance, willingness, motivation, etc.). The second category of definitions of competence considers competence as a criterion and a means of assessing the performance of education. For the third category, similar to the second group, by establishing a means of measurement and estimation, considers competence as the following: an open system of knowledge and skills; the unity of knowledge, skills and attitudes; the requirements defined by professional positions and activities; experience as a personality, thus forming a lifetime; a cross-industry knowledge, skills and abilities required for adaptation and productive activities; and a conglomerate of professional knowledge and non-professional skills. A unique aspect of the third category is the attempt to integrate the internal, subjective beginnings of the personality and environment requirements.

Based on the above background, in this work, *professional competencies* is understood as the ability to apply knowledge, skills and abilities in a specific area of human activity.

Being guided by the federal state educational standard of higher education and systematically categorising the professional competences listed in the standard, it is possible to define the following requirements imposed on the graduate of the 151900 direction “Design and technological ensuring of engineering industries”, receiving the title of “Bachelor-degree-holding engineer” as follows:

*To understand* the methods and the development tools, constructions and managements involved in the highly effective production of cars, along with the general and concrete data of the advanced practice of engineering art of creation of cars, their production, scope, processing equipment, equipment and control devices.

*To be able to* use progressive concepts of the improvement of production and the achievement of quality production.

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