

ADVANCED TENDENCIES OF RUSSIAN TRAINING IN ENGINEERING

L B Sobolev

**Moscow Aviation Institute
(National Research University)**

sobolev1b@yandex.ru

Abstract: This article is devoted to the problem of improving the quality of engineering education in Russia. The gap in the quality of engineering education and the growing requirements for graduates become increasingly noticeable and is an obstacle to the reforming and upgrading the Russian economy. The success of Soviet engineering schools was mainly associated with two military mega-projects: aerospace and nuclear involved leading technical universities. The transition to a market economy and integration into the global economic system require reforming engineering programs, strengthening the economic training of engineers and restructuring the technical universities. The Russian leading technical universities occupy relatively low ranks in international rankings. The purpose of this article is to help in choosing ways (trends) to improve the quality of Russian engineering education by means of a critical analysis of the leading world technical universities' experience.

ICMSIT-2020

**St. Petersburg - Krasnoyarsk
Russia**

The Government, the academic community, parents and graduates are concerned about the quality of higher education in Russia. It is known that many top officials and entrepreneurs send their children to study at well-known foreign universities. It is becoming increasingly apparent that in the context of globalization of the world economy, the low competitiveness of domestic products is associated with the low positions of Russian technical universities in international rankings.

However, one must understand that Russia is in a state of deep transformation of a command (plan) economy into a free market economy, that differ in attitude to the ownership of production means, the pricing of goods and services, the monopolization of production and distribution, the absence of a labor market and the role of the Government in the economy. According to the author, the strategy of economic transformation in the 90s was wrong and lead to the deep economic downturn, high inflation, and a drop in the living standards. In universities and research institutions the real salaries of teachers and researchers fell, state funding for R&D fell sharply and many scientists emigrated abroad.

The modern trend in improving higher education in Russia has been the introduction of international educational standards, the transition to a two-level system of education (Bologna system) and the recognition of international university ratings. Let us consider in more detail on the two-level system adopted now all over the world and in Russia.

The transition to a new model makes sense only if it is accompanied by a serious change in the programs and principles of the training. In Western universities, bachelors within the walls of university classrooms and laboratories receive complete training for practical activities in the enterprise. Only a part of universities have a license and a sufficient scientific and practical base for the masters and doctors of philosophy (higher academic degree) training. The purpose of masters' training is to write and defend a master's thesis (an analogue of a candidate dissertation in Russia).

Obtaining a degree opens the way for the master to pursue a scientific career in the scientific departments of a university or a partner corporation, create his own business in the form of a startup, defending a doctoral dissertation and the opportunity to start a teaching career.

What does the author suggest? In universities closely connected with the defense industry have to be divided the curriculums at the level of departments or faculties into those who work on military topics and those who work on civil topics.

There are too many differences between military and civilian customers: in technical requirements, level of competition, pricing system. The military customer is a monopolist limited by the defense budget, but there should be many civilian customers (industry partners) for civilian projects. Unfortunately there are few Russian innovative high-tech companies willing to sponsor university science. For university innovative projects (and startups), it is easier to find an interested partner abroad. Example: there is a cooperation of one of the MIRT departments with the American company Honeywell.

Thanks to cooperation with the international company Honeywell, students have the opportunity directly in the learning process to apply the theoretical knowledge gained in the practice of real projects.

Thirdly, it is necessary to overcome a gap between academic and university sciences. Obviously, the Russian Academy of Science (RAS) will not abandon its role as the “Ministry of Science” and will not transfer its many academic research institutes under the auspices of universities and industry, as China did, following the world trend. Here it’s necessary to look for good examples of cooperation. One of such examples is the Institute of Problems of Chemical Physics (IPCP) located in Chernogolovka (Moscow Region).

IPCP is one of the largest scientific centers of the RAS, which has great achievements in world and domestic science in the fields of chemistry, physics and engineering. On the basis of IPCP, a faculty of Moscow State University was created under the name "Fundamental Physicochemical Engineering" with undergraduate and graduate degree programs. This faculty has possibility not only provide the special courses but also organize research practice for students. Every student receives the individual topic for term papers on chemistry, physics and engineering. The interdisciplinary work is carried out in the Institute laboratories.

Thus the students accumulate a certain experimental experience for completing the data materials for the bachelor's degree, and then the master's thesis. There is also a postgraduate course at IPCP. The IPCP has agreements on scientific cooperation and practical training for students with many Russian universities including MGU, MAI-MATI and others [7].

Thank you for your attention!