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## **Integration of Universities and Industrial Enterprises as a Factor of Higher Vocational Education Development**

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### **Abstract**

The paper deals with integration of higher education institutions and machine building enterprises using the example of Petrozavodsk State University, Petrozavodskmash OJSC and AEM-technology OJSC. In development of such integration, an important part is played by the initiatives of the Russian Federation Government and the Russian Federation Ministry of education and science aimed at enhancement of innovative interaction of universities and industrial enterprises. It has been demonstrated that joint work of higher education institutions and industrial enterprises not only considerably raises the professional level of scientists, developers, pedagogues, postgraduate students of the university but also promotes higher quality and demand for professionals graduated by the university who are ready for efficient work in high-tech organizations of the real sector of the economy. Preconditions are created for the development of scientific research and innovation developments of young scientists and professionals, and the connection of academic and scientific process of the university with the production and commerce activity of the enterprise is consolidated.

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### **1. Introduction**

In innovation economy, the most important resource of economic entities is the intellectual property which cannot be implemented without the economic entity having an efficient system of formation, protection and

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implementation of innovation developments based on intellectual property (Shegel'man, Kester & Vasil'ev, 2012). It is no mere chance that in the recent years there has been active search for approaches to forming and implementing the technological and non-technological innovations both in Russia and abroad.

With regard to this, an essential part is to be played by sharing knowledge and competencies between universities, scientific organizations and Russian machine building enterprises. For Russia, such sharing is of a special importance because disintegration processes accompanying the market transformation of Russian industry entailed liquidation of most organizations of branch science that used to be created for solving the applied scientific problems of industrial enterprises. As it is known, it is only during the time span from 1990 to 1995 that the quantity of engineering organizations reduced 2 times, that of design and design and exploration organizations – almost 2,9 times, and scientific and technical units at industrial enterprises – 1,4 times.

This resulted in a critical shortage of qualified engineering staff and the enterprises had to look for new performers of applied scientific and research work and development efforts (R&D). As the foreign institutes cannot fill the resulting gap due to significant differences in technologies, approaches, systems of technical standards, and the innovation breakthrough objective that the Russian industry is facing is virtually unattainable without the applied science, the state began to develop the scientific potential of Russian higher education institutions, following the experience of the West (Salmi, 2009; Creation of world-class universities is essential, 2008; Building World-Class Universities in China: From the View of National Strategies, 2012).

Under these conditions, the universities of Russia gain a special significance transforming into educational scientific and innovation structures (Voronin, Shegel'man & Shchukin, 2013), which is promoted by the initiatives of the Russian Federation Government and the Ministry of Education and Science of the Russian Federation aimed at enhancing the innovation interaction of universities with industrial enterprises. In particular, the main directions of the interaction are the following:

- fundamental and applied R&D jointly with or to orders of industry;
- forming and protecting of intellectual property by universities for its commercialization by industrial enterprises, as well as for increasing stability;
- joint developments of universities and industrial enterprises as their strategic partners with grant support from the RF Ministry of Education and Science according to Resolution of Government of the Russian Federation No. 218.

In interaction with industrial enterprises, universities have to undertake the function of generating technological and non-technological innovations, including the intellectual property, its protection and commercialization.

## **2. Objectives, methodology and research design**

The goal of this work is to study and evaluate the influence of integration of universities and machine building enterprises on the development of higher vocational education – a case study of Petrozavodsk State University (PetrSU). The university has an impressive experience in the sphere of intellectual property formation and protection and cooperation with machine building enterprises, IT-companies and engineering structures.

Such integration experience was obtained by PetrSU during implementation of two comprehensive projects.

The first project "Creation of resource saving production of environmentally friendly transport and packaging set for transporting and storage of spent nuclear fuel" was brought to life jointly with open-type joint-stock company "Petrozavodskmash" (2010-2012) within implementation of Resolution of Government of the Russian Federation No. 218 dated 09.04.2010 "On measures of state support for the development of cooperation among Russian higher education institutions and organizations implementing integrated projects of creating high-technology production".

The practical significance of the results obtained consists in creating in Russia a competitive production of an extra capacity transport and package container for transporting and temporary storage of spent nuclear fuel, with subsequent manufacturing and supplying of them to enterprises-consumers, as well as in enhancing the environmental safety of transport and package containers, entrance of Russian machine building enterprise, Petrozavodskmash OJSC, with its competitive products to the international market (Shegelman, Romanov, Vasiliev & Shchukin).

The second project was "Creation of high-technology production of gate and wedge stamp and welded valves for

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