

Editorial

Moscow State University of Technology STANKIN:

Advanced scientific studies and research in Mechanical Engineering

Today one of the most efficient mechanism of science and technology development is an increasing support for the conducted researches at the leading centers of research and education. This was already proven in technologically advanced countries. Traditionally the universities are core of the integrated scientific and educational complex, which ensures fulfillment of a significant share of fundamental and applied research.

Large-scale modernization of the laboratory and technological base and foundation at the MSTU “STANKIN” in 2013 of an unique world-level technological ground allowed foundation of an unique platform for international scientific cooperation in the field of engineering technology, metalworking and materials science. Currently, the technological ground of the MSTU “STANKIN” includes not only various individual types of modern equipment, but also the whole technological and laboratory facilities, many of which already meet the sixth technological order: the laboratory of additive technology, the micro-processing laboratory, the laboratory of coating and heat treatment, the material characterization laboratory, etc.

In the last three years based on MSTU “STANKIN”, a number of scientific and educational institutions were created together with its leading European partners as:

- the Russian-French laboratory of innovative additive technologies,
- the Russian-Italian training center in the field of mechanical engineering and metalworking technology,
- the Russian-Swiss center of competence in the field of micro-processing technologies and
- the Russian-Spanish laboratory of electric currents and sintering technologies.

In the framework of the Russian-French laboratory the MSTU “STANKIN”, among the first in Russia, it started the development of technological bases and equipment for the production of complex-shaped products using selective laser melting of powder materials and their implementation for the domestic industry. The laboratory team has developed for the first time in Russia and has patented a set of innovative technologies of additive manufacturing (including those using the domestic powder materials) as well as it has created a new technology and domestic equipment for the entire chain of additive productions of multifunctional and complex-shaped engineering parts.

Using the spark plasma sintering in the framework of the Russian-Spanish laboratory, there were created nanocrystalline matrix composites, which is a new class of engineering materials, composed exclusively of nanometric layers with thickness of less than 100 nm. Created materials are remarkable for improved mechanical, magnetic, thermal, optical and catalytic properties; they can be used in the construction of a wide range of engineering equipment, tools and products. The success of these materials’ commercial use depends on the possibility of their use in large-sized machine parts (without impairing their nanostructure).

In the framework of the Russian-Swiss laboratory, there are under development and creation a number of technologies and automated equipments for nano-engineering of the product working surface intended to provide an unique set of performance properties. These studies can solve urgent problems facing the domestic machine-building enterprises and they are directed towards the development and creation of a number of import-substituting technologies and automated equipment for implementation of various working surface nano-engineering methods, which significantly enhance the performance characteristics and quality of high-tech engineering products.

The special issue “Advanced scientific studies and research in Mechanical Engineering” includes the results of innovative fundamental and applied research work carried out by the scientists of the Moscow State University of Technology “STANKIN” (Russian Federation) in collaboration with their partners from prestigious European scientific and educational institutions.

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