

POSSIBILITIES OF NANOINDUSTRY DEVELOPMENT BASED ON ENGINEERING COMPANIES ACTIVITIES

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Abstract: The paper analyses the current condition of chemical engineering and nanoindustry; possible ways of their development by means of organizing engineering companies' activities have been offered. The experience of production and promotion of nanoproducts on the European market has been examined.

The analysis of modern market tendencies shows that the role of chemical industry, which is focused on production of new constructional materials and development of progressive technologies of exhaustible natural resources potential, is growing in most developed countries.

The chemical mechanical engineering is a multi-profile subindustry of mechanical engineering that provides effective functioning of both chemical industry, and key sectors of Russian economy including fuel, energy, argoindustry, space, microbiology and medicine. In its turn, it promotes the development of an innovative component in the national economy. The share of chemical and oil domestic equipment accounts for 75–90 % of consumer industries. As a part of subindustry there are about 100 industrial enterprises and more than 30 research institutions and design offices. The implementation of high-technology production methods and application of experience of leading international companies allows chemical mechanical engineering to make advances in production.

It's obvious, that the sixth technological way will be determined in many respects by nanotechnologies. The nanostructured materials obtained in the lab experiments have already showed the outstanding performance in many sectors of the industry and construction [1, 2]. Today it is necessary to transfer from scientific research to industrial production. Creating and manufacturing of advanced equipment, intended for the implementation of local physical and

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chemical processes in the areas of nanometer sizes, has become the priority direction of chemical mechanical engineering development. This direction is one of the most promising today, since the investments of RUSNANO Corporation into the industry of nanotechnologies by 2015 will amount to 318 billion rubles. Successful work in the field of nanotechnology promotes an access of machine-building enterprises to the international market of high technologies and contributes to the growth of commercial appeal of domestic products.

The equipment produced by nanoindustry considerably differs from standard products of chemical mechanical engineering: heat exchangers, hydrocyclones, settlers, capacitor equipment etc. The equipment for nanomaterials manufacturing is 'unique' in its own way. This kind of equipment requires its permanent enhancement by implementing innovative technologies and developments of modern science [2]. For this reason the majority of companies specializing in nanoprocessing equipment cooperate with research institutions. It enables to adapt quickly to permanently changing environmental conditions with regard to scientific achievements in nanoindustry. Joint work of OAO Tambov plant 'Komsomolets' named after N.S. Artyomov with OAO 'NanoTech-Center' and OAO 'Tambov innovative-technological center of engineering' is a good example of such cooperation. The result of this work is the reactor of carbon nanomaterial registered under trademark 'Taunit', which has no analogs in the world.

Today this equipment is successfully marketed in the domestic and international markets. Production lines in different packaging arrangement have been supplied and successfully operating in Vladimir State University (Russia), Zhitomir (Ukraine) and Tokio (Japan).

However, the development of market relations accompanied with severe economic crisis prevents the majority of industrial enterprises in Russia from organizing effective cooperation with research institutions. As a result, the domestic equipment cannot always compete with its western analogs. Another important problem is weak organization of product promotion by Russian chemical mechanical engineering companies on the international market. Many companies that produce nanotechnology equipment do not invest enough in advertising on the international market. In most cases, these companies fully rely on internal market. As a result, potential customers working in nanotechnology do not have the opportunity to assess the equipment manufactured in Russia and find the best solution for a particular project.

These problems can be solved though joint work of engineering companies with companies specializing in providing engineering services (market analysis, gathering information on competitors, design, construction, equipment supply and installation, project management, technical supervision, engineering support of investment projects subsequent work, etc.). At the same time engineering companies are often involved in design of nanoproducts; as a result, they combine the functions of research and design institutes and engineering companies: they have to do the necessary applied research, design the production line and develop design documentation.

Engineering companies often take advantage of being formally independent and provide services in several areas, turning to various suppliers

and company contractors. An important feature of these companies is the ability to build a system of co-operation by employing a chain of different contractors. This means that the serial order can be split between several manufacturers of process equipment, thus reducing the production cycle and avoiding potential fines and expenditures [3].

The search for contractors and potential suppliers of equipment is one of the major activities of the engineering company. Suppliers are often searched via the Internet or by visiting various international exhibitions; the first method is the least expensive and time-consuming. The search procedure of potential suppliers via the Internet involves a number of stages:

1) collecting information on companies that manufacture the required equipment;

2) establishing contacts with potential suppliers, assessing their economic status and work experience in the required field of mechanical engineering including their annual turnover, the parameters of manufactured equipment, the types of commercialized products, etc.;

3) making agreements about the pilot project between the engineering company and the supplier with regard to the required parameters (quality, production time), budget, pricing, etc.;

4) arranging business meetings with the management and identifying future areas of cooperation: the possibility of placing current and future orders, work within the engineering cluster, etc.

The created database will enable an engineering company to provide a wide range of equipment and services in the market and contribute to the development of strong relationships between the customers and suppliers of the equipment.

An example of successful cooperation between the machinery manufacturer and engineering company can be joint work of such companies as OAO Tambov plant 'Komsomolets' named after N. S. Artyomov, 'Pacovské strojírna, a.s.' and engineering company 'Talmax Engineering sro' within the engineering cluster. As a result of this collaboration, a number of projects on manufacturing heat exchangers and storage equipment for the CIS and Europe have been successfully implemented.

Collaboration between manufacturing and engineering companies in the field of nanotechnology has a lot of advantages: integrated enterprises in Europe and Russia, production expansion, promotion, developing new markets, increase in company profits, etc.

The disadvantages of such cooperation include:

– challenges at the stage of design and approval of drawings caused by the differences in Russian and European standards;

– difficulties at the stage of product acceptance due to the remoteness of one company from another, etc.

To conclude, collaboration between engineering and manufacturing companies will enhance nanotechnology development in the country; increase the competitiveness of domestic enterprises, both in the domestic and overseas markets.

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Возможности развития nanoиндустрии на основе организации деятельности инжиниринговых компаний

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Ключевые слова и фразы: инжиниринговая компания; нанотехнологии; химическое машиностроение.

Аннотация: Проанализировано текущее состояние химического машиностроения и nanoиндустрии; предложены возможные пути их развития посредством организации деятельности инжиниринговых компаний; исследован опыт выпуска и продвижения продукции нанотехнологического назначения на европейский рынок.

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