

THE POWER EFFICIENCY RISE OF HEAT TECHNOLOGICAL SCHEME OF THE ETHYLENE PRODUCTION

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The ethylene production is the large consumer of the fuel and energy resources that is conditioned by the considerable fuel and energy consumptions at the multi – staged hydrocarbon raw materials processing. The system organization of the complex utilization of the repeated energy resources (RER) is the perspective direction of the fuel and energy cost cutting in the considered production.

The heat technological scheme of the ethylene production is included in itself several thousands elements of the polytypic equipment. To estimate the work efficiency of such complex system and to reveal the organization version of the RER utilization system are suggested on the basis of the system analysis, having included the structure analysis of the internal and external connections of the considered object, and also the thermal and thermodynamic efficiency analysis. Its calculated model has been obtained, as a result of the system analysis carrying out, in particular, in the issue of the dependences exposure between the scheme's elements, the separation of the elements' open – ended and closed sequences of the considered scheme. The thermodynamic efficiency analysis of the heat technological scheme has been conducted, that permitted to estimate the rate of the system thermodynamic perfection, to expose the losses from the irreversibility, to make the estimate of the elements efficiency in the system composition, to determine the technically well – behaved energy value, to estimate the energy conservation reserves.

The circuit solutions on the organization of the RER utilization system have been suggested, having provided the technological production and the energy resources working out in a view of the steam, hot water and cold of the required parameters on the basis of the steam – jet compressors and the absorptive refrigerating machines use.

The work is being conducted within the limits of the President's grant of the RF MK-2759.2007.8

The work was submitted to international scientific conference «Engineering sciences and advanced manufacturing», Nov. 26 - Dec. 4, 2008, China (Beijing), came to the editorial office on 19.02.2009.

PROBLEMS OF THIRD-GENERATION STATE EDUCATIONAL STANDARDS IN HIGHER PROFESSIONAL EDUCATION FOR QUALIFICATION “EQUIPMENT AND INSTRUMENTS IN CHEMICAL INDUSTRIES”

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Third-generation state educational standards in higher professional education (SES HPE) are aimed at forming a regulatory system for a better quality of the Russian education in the nearest future. A Ministry, responsible for developing this regulatory system of state educational standards, think, that the main distinctions of the SES HPE will be the following:

- strong competent character of the standards;
- development of standards for different professions. The corresponding degree is received after completing a bachelor, specialist or master educational program, which are united by a common fundamental basis;
- well-grounded requirements to learning results in the main educational programs (educational results) in form of competencies, divided into general (broad-based) and professional (subject disciplines);
- absence of component structure (federal, regional, institutional), and at the same time significant enlargement of academic freedom for higher educational institutions in questions of basic educational program development;
- establish new ways of labor intensity calculation in form of credit points instead of hours.

So, the third-generation SES HPE, according to the Ministry, will become a federal quality standard system for higher education. The norms should minimize their contradictory interpretation in the Russian regions and universities. Besides, these standards should simplify integration of the Russian educational system into the European one, and help the university graduates find employment in every country, that signed the Bologna Declaration.

So far, the Russian Ministry of Education and Science has not yet developed a clear strategy regarding deadlines and stages of transition to the new SES HPE; number of professions; differences between specialized secondary qualifications and university degrees; number of graduates with a specialized secondary qualification and university graduates in the labor market. But, without having solved all these questions, the Ministry has issued a decree that, starting from 2009, introduces a two-level degree structure - bachelor and master.

Such a tearing hurry in a serious matter of transition to new educational standards is absolutely incomprehensible. According to the «List of professions» on the official website of the Russian Ministry of Education and Science, there is practically no

course, which offers a technical specialist's degree, i.e. engineer. Russian universities are virtually forced to follow the western scheme of education in line with Bologna process model. Nevertheless, the universities have received a letter from Deputy Minister of Education and Science I. Kalina, dated 17.12.08, № IK-2112/03, that outlines a project list of professions, which allow obtaining a technical specialist degree. There are only 30(!!!) of those, instead of the existing 440. Our country does not have enough material resources and procedural framework for a such rush transition. Obviously, Russian higher technical school should base on their own methods and resources, and use European educational innovations, adapting them to the Russian reality.

A short look in the history shows it quite obviously, that our higher technical school has always had its own traditions and methods, and thanks to that, achieved excellent results in engineer training. The last two centuries of the Russian history prove, that our education is one of the best in the world. For example, our country and the army were technically well equipped during the First World War, which destroyed the plans of Kaiser's Germany for a blitzkrieg in the western front, and that despite a political weakness of Russia; prewar industrialization in the Soviet Union and its status of an industrially developed country; without any doubt, the victory in the Second World War, which is said to be won not by a soldier, but a school teacher. Postwar recovery of the national economy and creation of the nuclear shield, which let us exist until now as an independent state, is also an achievement of our good education. Another merit of our education is a postwar success of our country in space exploration. There are enough examples today as well – more than half of departments of theoretical and experimental physics or applied mathematics in many American and European universities are headed by the graduates from the Russian universities. This proves a high level of science and education in our country.

The soviet higher education provided the students with wide fundamental general knowledge, as well as modern scientific discoveries, technical and cultural achievements for a deeper learning of subjects. The higher education enabled the students to develop the integral worldview, creative skills, ability to analyze and generalize knowledge independently, carry out observations and experiments.

University graduates received good practical skills, as they had a chance to practice at the leading companies, research institutes and design engineering bureaus. The state supported the higher education, obliging employer to remunerate professionals for their work with trainees. It took 5 – 5,5 years to complete a study course at engineer department. Taking into account the high level of responsibility that engineers bear for their work, and according to the state rules, a graduate had a status of young specialist dur-

ing the first three years of employment. During these three years, the graduate continued to learn specific skills and get knowledge, typical for this industry, company or organization. In fact, it took 18 years to teach a professional (10 years of school, 5 years at the university and 3 years as a young specialist).

At present, higher engineering school in the USA and most European countries also includes 18 years of learning: 12 years in school, 4 years of bachelor study and 2 years of master study, in order to become an engineer or a scientist in this field.

Russian educational authorities offer to teach a professional in 14 years: 10 years in school and 4 years of bachelor study. The students have to pay for master's studies themselves. Isn't it an utopia for Russia's poor population? This utopia was supported by the majority in the lower house of the Russian parliament. Unfortunately, most of university presidents also gave up supporting rational principles of the Russian engineering education. For some reason, everybody stands for Bologna process model.

Why are we being forced to doubt the high level of the Russian education? Just because it remains the single fundamental stronghold, that has not been destroyed during the so called democratic reforms. Though we have to give credit to the adept reformers, they managed to damage this stronghold noticeably.

During the so called transformation and democratic reforms our industry was nearly destroyed. Even some Western analysts agree, that these reforms caused damages, which considerably exceed the losses after the Great Patriotic War. More or less undamaged remained natural resources sector and transport. This is simple to explain: the West needs raw materials and facilities for its transportation. Moreover, half of the natural resources have already become private, i.e. they are out of the state control. That is why petrol in Russia, with its huge distances, is more expensive than in the USA and some European countries, although the oil is produced in our country.

Natural reaction of the population against suffocating measures of the West made a part of our country leaders understand, that we are on the edge of a complete collapse. Then, came a hard statement of the Russian President at the summit in Germany, and his address to the upper house of the Russian parliament. These were landmark signals. Of course, wise and far-seeing as our current Prime Minister is, he is unlikely to implement his ideas without social support. Inland and foreign opposition is strongly against his patriotic steps.

The government can only rely on the army that remains to be a real sector of economy controlled by the state, military industrial complex and, of course, patriots among country's intellectuals. Most of them work in the above mentioned sectors of economy as well as in education, especially, in the higher engineering education. It is long clear, that the so called

artistic intellectuals switched camps and dance to someone's pipe.

These are the reasons of active reforms in the higher education. "Carthage must be destroyed!" The easiest way to do it, is under a mask of "progressive reforms", explaining to people, that our education falls behind the advanced West. There is nothing new in these attempts, compared with the Gaidar shock therapy and Chubais-style "voucherization".

Our higher education is being dragged and forced to accept Bologna process model. All of a sudden, the top educational authorities see the light and push, with a train speed, a transition to the two-level educational system. The nation has been told, that the country needs urgently a Bachelor's degree, which is to be completed within 4 years, and in future, in only 3 years. They have not asked taxpayers, employers and specialists, whether they need this ugly system? Taking into account the state of technical equipment at our universities, humiliatingly low salaries of the teaching staff, this threatens to destroy the Russian educational system completely, especially its higher technical school.

We will never believe, that these ideas have been proposed and pushed by fools or someone who does not understand the problems of education. Again, behind all this trumpery, money issue pops out. Via this reform, the state can save up to 20% of the budget allocated for education. At the same time, it can divide the universities into perspective and not perspective. As experts, some European educational community is being defined by Bologna Declarations. That means, a stranger will decide, which of the Russian universities should exist or disappear. And of course, under a mask of foreign experts, many our countrymen would work for a good remuneration.

Business, state politicians and authorities, which are often involved in business, also like this idea about perspective and not perspective universities. Soon, a huge amount of «free» real estate will appear in the best locations of our big cities.

At present, a top priority for the state (not for moneymakers in education, politics and business) is a problem of rapid growing financing needs for the country's education. Many Russian qualified specialists are highly rated in the West, and are even being afraid of, because they can restore Russia's might. The majority of them studied at the state universities. Only state enterprises and organizations should be able to employ these graduates for free, private business should fully compensate the education costs to the educational institution. For this purpose, amendments to the Education law regarding compensation of education costs to the higher educational institutions, should be urgently introduced, and the Russian government should develop a simple and clear mechanism for its implementation. The mechanism should be very strong. A company, which employs a graduate of a state university without letting it know, should pay a

high fine. These measures will quickly determine a real rating of the universities, and the state will not need to pay expensive and deeply corrupted bureaucrats, responsible for quality control in education. And the most important is, that universities become money for new equipment and laboratories, and can better pay professors for their hard work.

Due to a number of specific features, chemical industry takes a special place in the production sector. These peculiarities are caused by the following: diversity and focused specialization of equipment and instruments; wide range of raw material sources; high material insensitivity, energy consumption and level of automation. They determine high effectiveness of the chemical industry, its flexibility and ability to switch fast to a new production. Chemical, petrochemical and oil refining industry are equipped with diverse machines and devices, standard, nonstandard and special equipment. Using different types of energy, they process raw materials and products of a different aggregation state, aggressive and corrosive agents.

Development and technical improvement of chemical production require better equipment and technologies, as well as creation of new equipment types, in order to meet the higher requirements to its design.

Among the reasons restraining a stable functioning of the chemical industry, a high level of equipment's physical depreciation should be mentioned in the first place. In general, equipment in the chemical industry is deteriorated up to 67,2%, in some productions - up to 80 %, in, for example, polystyrol and styrene copolymer production – even 100%. Technical, technological and economical level of the chemical industry can be compared with the levels in the industrially developed countries about 10-20 years ago.

Heat exchangers, columnar mass-transfer apparatus and pumps in chemical and petrochemical industry account for over 70% of all costs for technological equipment. Fluid pumps and gas compressors take a dominant position among them. In production of methanol, rubber and artificial liquid fuel, gases are used with pressure of dozens and hundreds MPa. More than any other production, the chemical industry consumes artificial cold, produced by refrigerating equipment. Widely used in chemical and oil-chemical industry are dryers, crushing and classifying equipment, stoves and different reaction equipment.

The above mentioned machinery is also necessary for a successful functioning of fuel and energy sector, including atomic energy; military industrial sector; food industry, agriculture and others. Their development also depends on qualifications and skills of specialists for chemical production and general industrial production.

For development, installation, repair and maintenance of the equipment the employers do not need

half-educated self-made specialists, but well-educated constructors, designers, qualified operators, maintenance technicians and adjustors.

High level science and research are also a must for development of high-tech equipment. Earlier, the majority of the research work was conducted at the universities, for example, at the compressor building department of the Leningrad Polytechnical Institute (currently, St. Petersburg State Polytechnical University, Department of compressor, vacuum and refrigerator engineering), where one of the co-authors of this article completed a postgraduate program. As a result of intensive cooperation with the production sector and its support, activities of the compressor building research laboratory financed by the government, the department was one of the leading scientific centers of chemical engineering since the 1960s.

Active scientific work let increase the qualification level of engineers, created conditions for postgraduate studies. By the beginning of the 1990s the department of compressor building enrolled yearly 50 students, and more than 15 students undertook a postgraduate study. At the time of reforms in the beginning of the 1990s, the compressor building research laboratory of the Leningrad Polytechnical Institute ceased to exist, admission of students majoring in compressor building, reduced twofold. Postgraduate studies were no longer available, due to falling pres-

tige of scientific and teaching work, and because the scholarships were absolutely not enough for a living. Such examples apply to many specialized departments at technical universities. And for good reason, some representatives of the academic community mention, that transition to the two-level educational system will gradually make highly specialized departments come down [1].

To sum up, this are the content and consequences of the third-generation SES for profession «Equipment and instruments in chemical production» [2].

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The work is submitted to Scientific Conference “The Problems of International Integration of Educational Standards”, England (London) – France (Paris), April 20-28, 2009. Came to the Editor’s Office on 03.02.2009.