

$$A_2 = -1,89361 \cdot 10^{-7} t^{26,15019} \exp(-17,22498 t^{0,42329})$$

$$p_2 = 3,10791 - 0,019363 t^{1,29836}$$

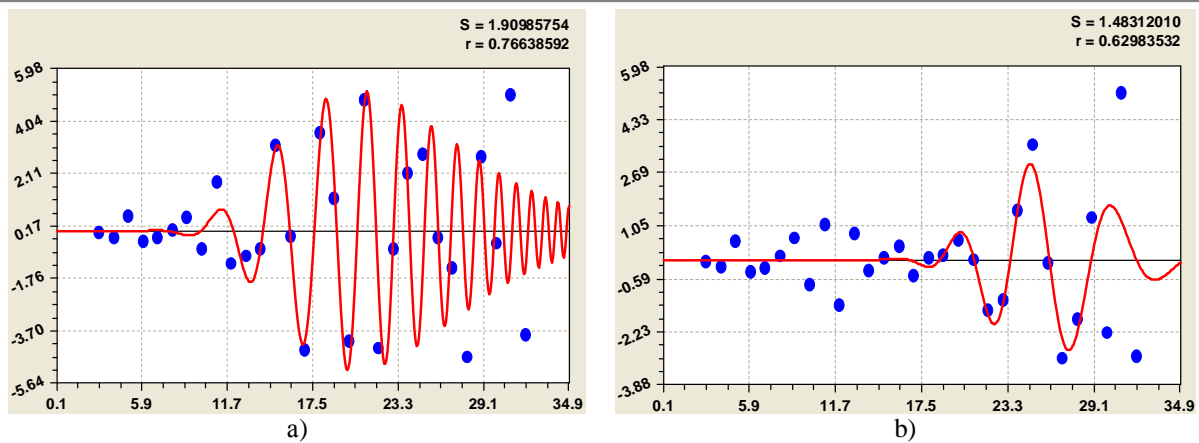


Fig. 3. Fluctuations of number of patents for inventions of the author of article a - the second crisis wave; b - the third wave (5)

The third wave (fig. 3b) on expectations of innovational economy looks like:

$$n_3 = A_3 \cos(\pi t / p_3 - 1,09730) \quad (5)$$

$$A_3 = 3,28139 \cdot 10^{-42} t^{42,72385} \exp(-1,56075 t^{1,01464}) \quad , \quad p_3 = 1,11506 + 0,026928 t^{0,97173}$$

Two more waves of indignation were received, one of which is the response to new hopes on adjustment of innovations of a world level.

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COMPETENCE APPROACH TO PSTU “POWDER MATERIALS SCIENCE” DEPARTMENT GRADUATES’ TRAINING

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One of the third generation SES projecting principles is the competence approach – the priority vector-goals orientation of education: capacity of study, self-determination, self-actualization, socialization and individuality development. [Baidenko V.I. Revelation of HEI graduates’ competence structure as necessary projecting stage of SES HPE of new generation: Methodical study guide – M.: Research Center of Specialists’ Training Quality Problems, 2006 – p. 72.]

Among the competences to be formed in a HEI’s graduates the general and professional ones stand out. In the general competences the learning-and-cognitive, informative and communicative ones

are distinguished. By the learning-and-cognitive competence an aggregate of cognitive activities skills; grasp of target-setting, planning, analysis, reflection, personal activity success self-esteem mechanisms; knowing of action devices in non-standard situations and heuristic methods of problem solving, measuring practice possession, use of statistical and other methods of perception, is meant. The informative competence is characterized by the ability to search, analyze, select, treat and pass the necessary information with the help of information technologies independently. The communicative competence includes the grasp of skills of interaction between the people close about, ability to work in group, acquaintance with various social roles. The professional competences are subdivided into the organization-and-managerial, economical, general scientific, general professional and special ones.

Many principles of the present-day approach to students’ training the Department of “Powder Materials Science” realizes successfully due to it system of specialists’ training. The Department’s history started in 1960. For all these years the Department Chairman has been Antsiferov V.N. – Member of the RAS, Laureate of the State Prize of the USSR, Prize Winner of the Council of Ministers and Ministry of Higher Education of the USSR, the Russian Federation Government Award Double-Winner, Owner of the Titles of “Honoured Worker of Science and Technology” and “Soros Professor”, Honorary Freeman of Perm;

awarded the medal “For Valiant Work”, the order of “Badge of Honour” and the “Order of Merits for the Good of Motherland” of the 4th Degree. Among the Department faculty there are the RF Government and Perm Region Administration Prize and other Rewards Winners. Presently, the academic process at the Department is conducted by 7 instructors in 29 academic disciplines, inclusive of 19 laboratory courses.

The main task of the Department is the training of encyclopedic knowledge experts in the area of Materials Science, Powder Metallurgy and Spayed-On Coatings Practices, Information Technologies, knowledge in the area of economics, management and right. The multi-tier system of education includes training of specialists with the conferral of academic degrees and qualifications: in the line of 150100 “Metallurgy” with bachelor and master degree award in technology (master program 550512 “Powder Metallurgy, Composite Materials and Coatings”); in the line of training a professional on the speciality 150108 “Powder Metallurgy, Composite Materials and Coatings”, specialization 110812 “Management in advanced materials technology”.

A characteristic of the academic activity organization at the Department of Powder Materials Science is the acquirement of research activities performance experience. The graduate papers of research character on relevant topics the students perform on the basis of the “Scientific Center of Powder Materials Science of PSTU”, the organizer and research supervisor of which is Antsiferov B.N. The Center is the leading organization performing basic and applied research on the priority orientations of the RF science and technology development in Russia in the area of powder materials science. At the Center’s disposal there is a staff of highly qualified specialists, the park of unique research and processing equipment from press arrangements to spectral analyzers and electron microscopes allowing performing the total cycle of research and the output of science-intensive products made of advanced materials worked out. The Powder Materials Science Department and the “SC PM” form a spatially united academic scientific complex, where the interaction and integration forms of the Department in the academic activity organization are realized. A number of the Center’s collaborators are invited to the lectureship on special disciplines of the academic curriculum, and the students are hired to work as junior technical and engineering employees, workers and laboratory assistants with remuneration to the Center (on their spare time). The students have accessibilities to the unique research and technological equipment of the Center, the teachers’ and students’ research carrying out in association with the Center’s collaborators, the performance of graduate qualification works of the Department students under the leadership of highly qualified collaborators of the Center and with the help of the Center’s equipment, the ac-

cess to the Center’s library stock and carrying out laboratory works on the Center’s equipment.

The teachers and students are given a modern research and educational and scientific equipment, laboratories for materials, metals, thermal treatment testing, submicroscopic and X-ray structural analysis, powder materials pressing and baking, gas-thermal and condensation-vacuum methods of coating. By the end of studies the students acquire basic skills of engineering and research activities, foundations of information technologies used in modern design, management and administration.

The graduate qualification works’ most effective form realized at the Powder Materials Science Department is the research paper topic – the works on the topic appointed individually to every student begin with carrying out of term papers on special and general technical disciplines, go on when carrying out the graduation bachelor work in the 4th year and students’ research work (SRW), and finish at carrying out the diploma project in the 5th year or master dissertation in the 6th year. All this time the student grasps the principles of the research activity and acquires skills of the work on the equipment in the collective of research assistants and engineers under the leadership of an experienced specialist and a teacher of the Department. The scientific results obtained by the student together with the results of the Center’s staffers are used while carrying out the Federal target programs and contractual research engineering for the leading enterprises of the Perm Territory and RF, that trains a responsible attitude of the student to the works performed.

The Department’s research work, wherein the students and post-graduates take an active part, is realized on several lines: the development of structurally heterogeneous functional powder materials with predetermined properties and made of metal alloys and ceramics; the investigation and nanocrystalline materials; the development of scientific foundations, facilities and technological processes of defensive and hardening coatings obtaining, the research and forecasting of highly porous cellular materials’ rheological properties at static and dynamic loading, the development of powder steels’ and alloys’ structural and phase change models at heat treatment and surface impregnation, etc.

The results of the scientific and pedagogical activities organization of the Department become the successes of the staffroom and the student collectives. Presently, the Powder Materials Science Department is one of the leading Departments of the Perm State Technical University, and according to the results of the Contest of Scientific and Pedagogical collectives of higher educational institutions of the Perm Region the Department body takes the top places regularly (in 2000 and 2005 – the first place). The scientific “School of Powder Materials Science” works at the Department of All Russia scale; it won the competi-

tion of the RF fellowships of the RF leading scientific schools research governmental support many a time and oft. In 1982 the student body of the Department as part of the Perm Polytechnical Institute got the prize in the name of Leninist Komsomol for the research works. Annually not less than 15 best students of the Department are awarded with medals, diplomas and certificates of merit of the RF Ministry of Education on the results of the graduation papers contest, and also the diplomas for the reports at conferences. The Department students were granted individual scholarships of the RF President, titles of "Soros student, within the framework of the European Community "Commet" and "Erasmus" on the collaboration in the area of teaching and research the students, post-graduates and teachers of the Department completed their training and practical study at the Technical University of Vienna. Among the graduates of the Department there are leaders of enterprises and regional Administration.

The results of the accumulated practical experience, pedagogical and scientific activities of the Department's body are published in textbooks, 43 monographs, 27 learning guides. More than 50 new courses have been developed at the Department, 78 titles of study aids have been published.

Since 1970 a postgraduate study has been opened at the Department, and in 1991 – the doctoral studies on scientific specialties 05.16.06 "Powder metallurgy and composite materials" and 05.02.01 "Materials Science (industry)" were opened. Under the direction of the academician of the Russian Academy of Science V.N.Antsiferov 22 doctor's and 68 master's theses have been protected.

Thus, the academic process organization system at the Powder Materials Science Department, especially in senior courses, when the graduate performs research and developments under the leadership of highly qualified experts and teachers independently, working in the collective and realizing the responsibility for his work to it, together with the material remuneration and motivation to publishing his results allow forming not only the professional, but also learning-and-cognitive, informative and communicative competences in the graduate.

Since 2008 a new professional educational program of specialists training on the specialty 210605.65 "Nanomaterials" has been working at the Department. The accumulated experience of students' training will be a pledge of training highly qualified experts in the area of nanotechnologies and nanomaterials.

The work is submitted to the Scientific International Conference «Innovative Technology in Higher and Vocational Education», August, 2-9, 2008, Spain, came to the editorial office on 23.07.2008.

ROLE WHICH IS GIVEN TO THE STUDENT IN EDUCATIONAL SYSTEM

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Today in the modern press the problem of participation of the student in scientifically-educational process for which it and is developed at all is not shined. All publications reflect directions on which it is necessary to move, there is a search of ways of perfection of technology of teaching, science and education integration, attempts to make scientifically-educational process innovative and many other things are undertaken. Scientific researchers are not carried out in our country in the field of interrogation of students and schoolboys that give existing education to them, what lacks exist in educational process according to their representations, that in their opinion it is necessary to change in an education system. First, this area of research represents very important component, capable to find the best ways of creation of innovative scientifically-educational system; secondly, involves students to participation in working out of such program; Thirdly, forces young generation to think and develop as in power of thinking, and learns to reflect the thoughts in the verbal form; fourthly, it is scientific work for students who under the guidance of leading scientists can make questionnaires most prominent aspects of educational system; fifthly, this creation, on the basis of the deep analysis of existing educational programs and the relation to them of the basic consumer (his career: professional suitability, device possibility on specialties, scientific growth, conformity to requirements of customers already at an employment stage etc.) Concepts (which today in our country simply does not exist) capable to make scientifically-educational process innovative; sixthly, it is research work, training and career for a large quantity of sociologists, philosophers, psychologists and experts in other disciplines on the scale of all country at existing specificity of schools, high schools, educational systems etc. Thereupon for teachers disappears necessity: search within the precincts of educational institutions that of dissertations; preparations of pseudoscientific researches for career growth; to be broken off on performance of the basic work and carrying out of scientific researches (one in a damage of another). If the teacher aspires to give simultaneously a quality education and to raise the status in scientific activity creation of a feedback the student-teacher will be the best achievement of this purpose and. Self-development and perfection of pedagogical and scientific activity for both parties, adjustment of contacts, mutual understanding, appeal creation scientifically-educational programs and for teachers ability to light an audience to draw attention and to interest students to master a subject that should lay down in a basis of reports on the activity as the scientific work, allowing