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Odessa National Polytechnic University***Bukovskyi O.O.***Postgraduate Student,
Odessa National Polytechnic University***DIRECTIONS AND MECHANISMS OF DEVELOPMENT
OF THE AVIATION SCIENCE AND TECHNOLOGIES IN UKRAINE**

The article presents the suggestions of providing the development of the aviation science and technologies in Ukraine. It was defined the goals, objectives and stages of implementation of complex solutions for development of aviation science and technologies of Ukraine, outlines the contents of the main activities for the development of aviation science and technologies and aircraft manufacturing industry of Ukraine. It's done the forecast of positive effects for the innovative development of aircraft manufacturing sphere of Ukraine from implementation of the proposed activities.

Keywords: aviation science, aviation technologies, aircraft manufacturing, aviation industry.

Соколи І.І., Буковський О.О. НАПРЯМИ ТА МЕХАНІЗМИ РОЗВИТКУ АВІАЦІЙНОЇ НАУКИ ТА ТЕХНОЛОГІЙ В УКРАЇНІ

В статті наводяться пропозиції щодо розвитку авіаційної науки та технологій в Україні. Визначаються цілі, завдання та етапи реалізації комплексу рішень з розвитку авіаційної науки та технологій України, викладається зміст основних заходів, визначаються показники досягнення цілей і вирішення завдань розвитку авіаційної науки та технологій. У висновках робиться прогноз позитивних ефектів щодо інноваційного розвитку авіабудівної сфери України від впровадженні запропонованих заходів.

Ключові слова: авіаційна промисловість, авіаційна наука, авіабудівний комплекс, авіаційні технології.

Соколы И.И., Буковский А.А. НАПРАВЛЕНИЯ И МЕХАНИЗМЫ РАЗВИТИЯ АВИАЦИОННОЙ НАУКИ И ТЕХНОЛОГИЙ В УКРАИНЕ

В статье приводятся предложения по обеспечению развития авиационной науки и технологий Украины. Определяются цели, задачи и этапы реализации комплекса решений по развитию авиационной науки и технологий, излагается содержание основных мероприятий по развитию авиационной науки и технологий Украины. Делается прогноз положительных эффектов для инновационного развития авиационной сферы Украины от внедрения предложенных мероприятий.

Ключевые слова: авиационная промышленность, авиационная наука, авиационный комплекс, авиационные технологии.

Statement of the problem. Modern depression state of aircraft industry requires the development of a set of measures which will provide its output at a high international level. The scientific objective of the development of this complex is to define the goals and objectives for the development of Ukrainian aviation industry, in which aviation science and technologies plays the one of the main roles.

Analysis of recent researches and publications. Problems of innovative development of the aviation industry of Ukraine is a subject of many publications in which it is possible to trace the evolution of views on its role and place in the development of the state, and ways to ensure progress in its structural organization and methods of work. Problems of development of aviation industry of Ukraine were investigated by such experts as V. Androsova, СТ. Boguslaev, Burchinsky, S. Goncharov, V. Gorbulin, V. Zagorulko, S. Short, A. Kachan, D. Kiva, G. Krivov, J. Kulaev, N. Pechorin, C. Pedraza, I. Sokoly, A. Shevtsov, etc.

Definition of the unsolved questions. The main question of scientific problems is the development of complex organizational and economic activities, which provide conditions for development of aviation science and technologies in Ukraine, taking into consideration the factor of globalization and challenging economic conditions.

The scope of the article. The scope of this work is to develop a set of measures that will provide conditions for effective development of aviation science and technologies of Ukraine. These goals include:

– to define goals, tasks and stages of implementation of complex solutions for development of aviation science and technologies of Ukraine,

– to develop and justify the main activities for aviation science and technologies of Ukraine

– to define the criteria (indicators) of achievement of the goals and objectives of the development of the aircraft industry.

– to predict positive effects in terms of development of aviation science and technologies of Ukraine by the introduction of the proposed measures

Main part. According to a specified state priorities [1; 2] of development of the aviation industry and technology [1; 2], the main objective is creating a globally competitive and efficient domestic aviation science, creation and maintenance of scientific-technological potential, ensuring the competitiveness of national industry and leadership in advanced aircraft technology.

The achievement of this goal should be achieved by achieving the following interrelated goals:

1. Improving the mechanism of management of scientific research and the creation of an effective system of interaction between academia and industry to develop and introduce advanced technologies;

2. Carrying out research works on priority directions of development of aviation science and aeronautical technologies;

3. The creation of scientific and experimental base according to future requirements;

4. Research on international projects.

To solve the above main objectives the development of science and technologies of the aviation industry need to consider the use of a new for Ukraine, but accepted in the world practice approach to formation of scientific-technical tasks (STT) based on estimates

of the levels of readiness of technologies in the innovation cycle.

This approach involves the use of to control the technological development of the 9 readiness levels of technologies, corresponding to the stages of the creation of the STT. In this case the first 6 steps worked without a direct relation to specific programmes (projects) the creation of new aircraft and completed the creation and demonstration of models (prototypes) aircraft systems/subsystems. At the same time in the same conditions in the course of technological preparation of production brought to the stage of practical implementation and new manufacturing and repair technologies, IT technologies, implementation of which usually requires additional infrastructure costs were not given in full the programmes of new aircraft. Consequently, the evaluation of technologies is carried out not only on the methodology of technology readiness levels – TRL – technology readiness levels, but also the willingness of industrial technologies – MRL – manufacturing readiness levels. At the same time in the same conditions in the course of technological preparation of production brought to the stage of practical implementation and new production technologies, implementation of which usually requires additional infrastructure costs were not given in full the programmes of new aircraft.

We propose a new approach to conducting research that requires you to enter a new operational criteria governing the financing of works on creation and development of aviation technology in the formation of STT and upgrading the production base and development of technologies for implementation of programs (projects) of creating a new aviation technology. The proposed approach to the development of aviation technology will allow, in particular, significantly reduce the risks of the implementation of aviation projects.

Organisationally, this approach requires the selection of works on creation of the R&D and renewal of the experimental base in separate directions of state activities for the development of the aviation industry.

Base to achieve the foregoing main objective of development of aviation science and technology should become a national development plan of science and technology in aviation (further – national plan), which defines the objectives and priorities of the work to create npov. Initial data for the formation of the National plan are forward-looking estimates and trends of development of aviation in the world and the tasks of the state security, development of economy and social sphere.

In the structure of the National plan provides:

1. to reflect the current level of development aviation science and technologies;
2. problems and their possible solutions with the goal of providing technology in the aircraft industry at the level of world requirements;
3. to formulate the objectives and tasks of scientific and technological development of aviation in mutual alignment with sector plans of developing advanced aircraft;
4. to identify priority areas and key targets for development (linked to milestones) science, technology and technological competence of manufacturing enterprises, infrastructure and supporting facilities aircraft industry.

For detail composition and resource maintenance of works on creation of the STT in the aircraft industry in accordance with the Program activities you plan to use a Comprehensive research plans and the Comprehensive plan for the development of experimental and

polgono database, which are developed on the basis of the National plan.

A comprehensive research plan is created for achieving key objectives and addressing the key issues of the creation of the STT in accordance with the provisions of the National plan and implemented taking into account the proposals of the sectoral research institutes, leading scientists and industry experts, corporate, University and academic science, as well as relevant technology platforms and innovative territorial clusters on a competitive basis. At the same time a Comprehensive research plan are the justification for the development of scientific, technological and engineering infrastructure, provides the planned experimental research and serves as the basis for the formation of the Comprehensive development plan proving grounds and testing facilities. Composition, thematic content, resource support (by year of the planning period) comprehensive plans and the results of their performance during the reporting year, analyses and clarifies the terms associated with the rules of procedures of the budget planning process.

The formation of comprehensive plans is the main task of the Expert Council of the aircraft industry, which should be limited in composition (10-15 people) and to involve the most authoritative experts in the field of aviation. The main functions of the Expert Council and expert committees:

1. expertise in planned and ad-hoc basis, with the assessment of the validity, feasibility and priority of proposals for the execution of works in the framework of the Comprehensive plans;
2. participation in the definition of performers of research;
3. conducting year-end analysis of the progress and results of implementing Integrated plans and achievement of performance targets;
4. consideration of proposals to amend comprehensive plans and resource support;
5. identification of scientific, technical, financial, economic and organizational problems arising in the implementation of the Comprehensive plans, and development of recommendations for their solution.

The introduction of the proposed measures for the development of science and technologies of the aviation industry in the future will become a consolidated tool that implements the state of the resource providing all the implementation of the National plan, incorporate the relevant sections of the proposed activities.

Implementation of the proposed measures on the development of aviation science and technology is planned in two stages.

Phase I is dedicated to reform the management of research and development in the industry, creating conditions to radically increase the efficiency of creating a scientific-technical reserve in the field of aviation science and technology. This requires the development and adoption of the National development plan of science and technology in the aviation industry, a Comprehensive research plan and Comprehensive development plan proving grounds and testing facilities, introduction of an obligatory system of assessing the level of readiness of technologies in existing governance arrangements the creation of a scientific and technical reserve and the development of promising models of aircraft. Other plans include the adoption of monitoring, control and evaluation of the results of completed research, as well as monitoring and adjusting activities and funding.

Phase II is dedicated to the implementation generated in the previous step mechanisms control the cre-

ation and implementation of the R&D developed in the previous stages and the innovative technologies that allow to provide Ukraine world leadership in the field of aviation science and technology. At this stage the emphasis is on the following tasks:

- carrying out research works on priority directions of development of aviation technology.
- maintenance and development of scientific-experimental base of aviation science in accordance with the Comprehensive development plan proving grounds and testing facilities.

Achieve certain goals it is expected to be implemented through the following measures:

The goal "improvement of the mechanism of management of scientific research and the creation of an effective system of interaction between academia and industry with the aim of development and introduction of advanced technologies" is provided by the development and adoption of the following normative-legal and administrative documents:

1. Amendments and additions to the legislation of Ukraine in part of creation of the system of compulsory assessment of scientific and technical level and readiness level technologies in the development and modernization of aviation equipment for military and special purpose and civil aviation (in case of public funding);

2. Modification and additions in acts of the Cabinet of Ministers, which provide for mandatory assessment of level of readiness of technologies for implementation of works on creation of scientific and technological reserve in the sphere of aviation technologies;

3. Development and approval of normative legal acts of the Cabinet of Ministers that establish the rules for access to proving grounds and testing facilities in the field of aviation, referring to its national status, including mechanisms for its collective use;

4. Coordination of the themes and directions of research works on creation of scientific and technical reserve in the field of aviation with the state target program of development of science and technologies in Ukraine;

5. Approval of the scope and content of works on creation of scientific and technological reserve in the sphere of aviation technologies with the activities of technology platforms and innovative territorial clusters in the field of aviation;

6. The creation and development of innovative regional clusters and centres of technological development in the field of aviation;

7. Elaboration of proposals on improving the procedure of implementation of the state plan of training scientific workers and specialists for organizations of defense-industrial complex;

8. Development and approval of the National development plan of science and technology in the aviation industry, a Comprehensive research plan and Comprehensive development plan proving grounds and testing facilities;

The goal of "Carrying out research works on priority directions of development of aviation science and technology" is achieved via the implementation of research according to National plan for the development of aviation science. The main directions of research and development in the field of aviation for the long term, forming the basis of the National plan, and the Comprehensive plan of the research will be divided into the following areas:

1. Strategic planning and technological forecasting.

2. Current and fundamental research in main directions of development of aviation science;

3. Improvement of the methodology of numerical simulation and experimental studies, the development of experimental and field base;

4. Research work on complex scientific and technological projects;

Implementation of comprehensive scientific-technological project is being implemented jointly by science and industry. To manage the implementation of projects are created relevant working groups (teams of performers, which include researchers, designers, engineers), whose main tasks are:

- analysis of the state scientific and technological potential necessary for the implementation of the project;

- definition of requirements for tactical-technical and technical-economic indicators of the project (the value that is specified by market and/or potential consumers);

- development of the research plan, as well as other works aimed at realization of the complex project;

- system integration technologies developed within the framework of the complex project;

- monitor the status of the industry within the framework of the project implementation and periodic (not less than 1 time in half a year) assessment of results of performed works;

- preparation of conclusions about the status of the project, including recommendations on the adjustment of the plan or termination of the project.

5. Research in the area of system integration technologies.

Research in the area of system integration technologies are performed to control the creation of technological advances in the aviation industry and include:

- multidisciplinary design and shape the perspective aircrafts;

- coordinating and managing the implementation of complex scientific and technological projects, including the assessment of the level of readiness of technologies;

- constant monitoring of search results and fundamental research to prepare proposals on formation and realization of complex scientific and technological projects;

- organization of interaction between science and industry in the development and implementation of promising aircraft projects/programs.

The goal of "creating a meet the future requirements of the scientific-experimental base" is achieved through the provision of budget investments for development of scientific, technological and engineering infrastructure, including on the basis of innovative territorial clusters, according to the National plan for the development of aviation science and the Comprehensive development plan proving grounds and testing facilities. In the framework of this event intended to work in the following 3 areas:

1. Expanding the range and quality of bench testing and field testing.

2. Increasing the economy, efficiency, reliability, and security studies.

3. Development and unification of software and computer security research.

The goal of "Ensuring the execution of state functions and management of industry science" is achieved through the provision of subsidies to ensure the execution of state functions and control industry science.

In the event you intend to work in the following areas:

1. The conduct of public examinations and oversight functions.

2. The development of experimental and polgono base.

As a result of executing the proposed solutions for the development of aviation science and technology within the constraints of budget funding provides for the use of the following targets (indicators):

- the volume of internal expenditures on research and development.
- spending on research and development related to the number of researchers in scientific organization.
- the number of domestic and foreign patents (certificates) of intellectual property, the scientific organizations and employees for the evaluation period related to the number of researchers in research institutions.
- number of publications and the qualification of scientific works of employees of the scientific organizations related to the number of researchers in research institutions.
- the number of created technology demonstrators and prototypes.
- average annual value of fixed assets by main activity of the scientific organizations related to the number of employees performing research and development.

Conclusions. Implementation of the proposed measures on the development of aviation science and technology will deliver the following results:

- to establish an effective system of management of scientific research in the industry, including the establishment of a mechanism to ensure coordination in research and development of advanced technologies between academia and industry;
- to create and maintain an updated scientific and technical potential, which allows the Ukrainian avia-

tion industry to make a breakthrough on several key areas of development;

- to provide the domestic aviation science is one of the best scientific and experimental bases in the world, allowing it to implement promising research work at advanced research institutions in the world, and also to provide carrying out certification tests of new samples of aviation equipment;
- to provide an active participation of Ukraine in conducting advanced scientific research in the area of aviation in the framework of international programs subject to the priority supply of the establishment of the STT from domestic aviation industry.

REFERENCES:

1. «Стратегія розвитку вітчизняної авіаційної промисловості на період до 2020 р.» / Распоряжение КМУ от 27.12.2008 г. № 1656-р. «Офіційний вісник України». – 2009. – №1. – С. 77. – Ст. 19.
2. Рішення РНБО України «Про стан виконання Державної комплексної програми розвитку авіаційної промисловості на період до 2010 р. та першочергові завдання розвитку вітчизняного авіабудування». – К., 30.05.2008 р. [Електронний ресурс] – Режим доступу: <http://zakon.rada.gov.ua>.
3. Борисенко П.А. Методичні підходи до визначення поняття «наукоємне виробництво» (на прикладі авіаційної промисловості) / П.А. Борисенко // Схід. – 2008. – № 5 (89). – С. 27–32.
4. Инновационная экономика (Под ред. Дынкина А.И. Ивановой Н.) М., Наука. – 2001.
5. Porter M.E. Bond Y.C. Innovative Capacity Prosperity : the Next Competitiveness Challenge in the Global Competitiveness Report N.Y. 1999. p.62.
6. «Государственная экономическая политика США : современные тенденции» М.: Наука. – 2002. – 348 с.