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## SCIENTIFIC BASIS FOR THE STRUCTURAL TRANSFORMATION OF THE AVIATION INDUSTRY OF UKRAINE

### НАУКОВІ ЗАСАДИ СТРУКТУРНОГО ПЕРЕТВОРЕННЯ АВІАЦІЙНОЇ ПРОМИСЛОВОСТІ УКРАЇНИ

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*Соколи І.І., Буковський О.О. Наукові засади структурного перетворення авіаційної промисловості України. Науково-методична стаття.*

В статті наводиться комплекс заходів для забезпечення стійкого та якісного розвитку галузі авіабудування України в умовах жорсткого конкурентного ринку та вимог вступу до СОТ. Запропоновані заходи диференціюються за основними складовими галузі авіабудування: літакобудування, авіаційне двигунобудування, авіаційне агрегатобудування та її адаптація до світових стандартів, а також інтеграція до світової системи кооперації в авіабудуванні. При розробці заходів основний акцент зроблено на принципі мінімізації бюджетного фінансування та використання непрямих механізмів державної стимуляції розвитку авіабудування. Окремо розроблені заходи щодо забезпечення державної підтримки вітчизняної авіабудівної галузі в в рамках дотримання умов СОТ.

*Ключові слова:* авіаційна промисловість, літакобудування, авіаційне двигунобудування, авіаційне агрегатобудування та приладобудування, авіаційна наука та технології

*Sokoly I.I., Bukovsky O.O. Scientific basis for the structural transformation of the aviation industry of Ukraine. Scientific and methodical article.*

The article presents a complex of measures to ensure the sustainable and qualitative development of the aircraft building industry of Ukraine in the conditions of rigid competitive market and the requirements of accession to the WTO. The proposed decisions are separated for main components of the aircraft industry: aircraft construction, aviation engine manufacturing, aviation aggregate and instrument manufacturing, aviation science and technology. The main directions of development is structural reform of the aircraft industry and its adaptation to international standards and integration into the world system of cooperation in the aviation industry. The focus of the development of measures is the principle of minimizing of government funding and the use of indirect mechanisms of state stimulation of development of aviation manufacturing industry. Separately it was developed the measures to ensure the state support for domestic aircraft industry due to WTO conditions.

*Keywords:* aviation industry, aircraft construction, aviation engine manufacturing, aeronautical engineering and instrumentation, aviation science and technology

The issue of securing the output of the aviation industry of Ukraine to the world level is important nationally, the main directions of the development of Ukraine's aviation industry are defined in the priority state programs and decisions of the Government [1, 2]. The main scientific and practical task of the development of the aviation building industry of Ukraine is the harmonious integration into the world aircraft building industry, which requires the organizational and technical restructuring of the infrastructure of aircraft engineering, the transition to new principles and methods of management, adaptation to the world canons of industrial management.

#### Analysis of recent researches and publications

The main solutions to the problem of structural adjustment and development of the aircraft building industry of Ukraine are presented in works by V.M. Geitse, V.M. Zagorulka, D.S. Kivy, V.O. Boglasyev, G.M. Kirpa, I.M. Kaparulina, V.S. Kupriyanova, P.A. Borisenko.

#### Unsolved aspects of the problem

The main unsolved issues of the task of ensuring the development of Ukrainian aircraft industry are the search for optimal solutions for the restructuring of the industry in terms of minimizing budget financing, taking into account the processes of globalization and the requirements of the modern competitive market of aircraft engineering.

*The aim of article is to develop and substantiate the decisions on creating conditions for the effective development of the aviation building industry of Ukraine under the current conditions in accordance with the state priorities, with a separate allocation of complexes of activities in the field of aircraft engineering, aeronautical aggregate and instrumentation, as well as aviation science and technology. A separate task is to develop measures to adjust the mechanisms of state regulation in the field of aircraft engineering in accordance with WTO requirements.*

### **The main part**

In the field of aircraft construction, the main areas of reform are the restructuring of the aircraft industry to the requirements of the current conditions of a highly competitive and high-tech market, the expansion of the presence of enterprises of the aircraft industry in the international markets and the development of a global service network and after-sales service system. The restructuring of the industry is based on a two-phase basis: the first phase (preparatory) in turn consists of two stages: the first (analytical) – the identification of assets that do not meet the actual conditions, and the second stage (the action) – the liquidation or re-profile of the assets, and as well as the introduction of modern general methods of quality control and management, and obtaining the necessary international certificates. In order to provide financing for activities other than the traditional budget facility (which in the current conditions is substantially limited), we are proposing to apply such extra-budgetary mechanisms for attracting investments as conducting partial privatization of the industry and conducting an IPO, and implementing a system of targets aimed at increasing the cost of the company (EVA, ROA, ROIC). The second phase of the restructuring of the aircraft industry involves the transition to a new industrial model that is used in modern world aircraft construction. In the framework of this phase, two main measures are envisaged, the first is the formation of a competitive environment for suppliers of low redistribution, the development of small and medium-sized innovative high-tech enterprises of aviation industry on the terms of public-private partnership, restructuring and allocation of outsourcing of excess, noncompetitive and auxiliary productions (carried out including on the basis of profile innovation territorial clusters), and the second – optimization and modernization of production assets of enterprises of the industry by means of optimization and concentration of internal productions of high redistribution, the creation of centers of key competencies of "Antonov" concern, the inclusion in the system of world production cooperation, the completion of corporate procedures for the consolidation of 100% of shares of major DZO owned by the "Antonov" concern and optimization of the management system of the industry in the framework new industrial model. An important factor in the implementation of the proposed measures is funding mechanisms, which should be built on the principles of minimizing direct budget financing in favour of maximizing the use of indirect methods. We propose the following mechanisms of state financial support for the transition to a modern industrial model:

1. Financing of the system of subsidies to Ukrainian producers of aircraft and aviation engines for the reimbursement of part of the cost of paying interest on loans received from credit organizations of Ukraine and the state leasing company "Ukrtransleasing" for technical re-equipment
2. Financing of the subsidy program to private leasing companies for the reimbursement of part of the cost of paying interest on loans received from credit organizations and state corporation "Ukrtransleasing" for the purchase of aircraft with subsequent transfer to Ukrainian airlines under leasing contracts, as well as to these companies and aircraft manufacturers – for loans received from credit organizations of Ukraine and state corporation "Ukrtransleasing" for the purchase of simulators for domestic aircraft
3. Financing subsidies for commercial companies, based on which network of service centers providing 24/365 support at the global level will be created.
4. Provision of state guarantees to organizations of aviation industry, which carry out their activity in the field of aircraft construction on long-term loans of first-class banks, especially foreign
5. Government orders for An-70 \ 72, An-32, An-140 \ 148, potential state-owned entities such as the SBU, the Ministry of Internal Affairs, the Ministry of the Interior, the Ministry of Emergencies, and the Administration of the President of Ukraine.
6. In the segment of small aviation and NLA, the main mechanisms for the development are the provision of tax privileges (mainly on land, as manufacturing enterprises traditionally occupy large areas of land) and budget financing of subsidies to manufacturing companies for the certification of aircraft for local and regional air lines and NLA economic purpose with a full cycle of domestic production, as well as preparation and certification of PS production.

The implementation of the proposed measures in our opinion will achieve the following results:

1. To form a competitive international corporation "Antonov" of world-class level with the optimal complex of production assets and a balanced product portfolio, and with a transparent system of management of enterprises of the aircraft industry of Ukraine. "Antonov" Aircraft Construction Corporation will receive modernized production facilities and well-established production processes that are consistent with world-class standards, as well as implement modern technologies and form the necessary key competencies.
2. To support the stable profitability of the enterprises of the aircraft industry of Ukraine with optimally restructured debt and the established portfolio of long-term orders, which is a stable source of profit.
3. To bring products of aircraft engineering of Ukraine according to the technical characteristics in full compliance with the perspective requirements of the competitive market and the world organizations (ICAO,

etc.), to establish international integration and cooperation, to diversify the suppliers of components, to build a global service network, which operates efficiently and does not yield to the quality provided service favours to the main competitors, as well as the transition to life cycle management projects.

4. To satisfy the needs of Ukraine in aeronautics is largely domestic producers.
5. To provide significant contribution of domestic aircraft building to the national security of Ukraine.
6. In the segment of small aviation, upgrade the model line of the existing fleet of small aircraft, organize on the territory of Ukraine the production of modern small aircraft both domestic and foreign development, as well as develop and certify a number of promising types of small aircraft.

In the field of aviation engine construction, the main areas of reform are restructuring of motor industry companies, access to the world market as component suppliers of level 2-4, diversification into non-aviation markets, and access to the world market as a supplier of competitive aviation engines. The scheme for aviation engineering restructuring is broadly identical to the aircraft industry restructuring plan described above, and includes three main activities: the analysis and elimination of unnecessary and non-current assets, the introduction of modern mechanisms and principles of industrial management of processes (Lean Six Sigma, etc.), and the introduction of a system of target indicators aimed at increasing the cost of companies in the field of engine construction (EVA, ROA, ROIC). The financing of these measures is provided both at the expense of the budget (granting of subsidies to Ukrainian manufacturers of aviation engines for the reimbursement of part of the cost of interest on loans to banks in Ukraine and the state corporation "Ukrtranslasing" for technical re-equipment for up to 5 years, as well as part of the cost of leasing payments for the technological equipment), as well as by attracting private investment capital (stakeholder of the industry and conducting an IPO in order to increase the participation of private equity in equity companies in the field of engineer). The decision of the issue of Ukrainian aircraft engine development to the world market and integration into the world aircraft building industry as a supplier of components level 2-4 is solved at the level of enterprises and at the state level. At the enterprise level, measures include an initial phase for the introduction of the advanced quality control and control systems (Lean Six Sigma, etc.), further, the second phase solves the problem of entering the existing supply circuits of aviation engine construction components by creating joint ventures on the platform of the "Motor Sich" Corporation for the development of production of aircraft engine building, as well as the formation of uniform transparent pricing conditions for customers. The third direction of ensuring the efficient functioning of the aviation engine industry is diversification into non-aviation markets, in which we propose to focus on the development of the production of terrestrial gas turbine plants, the main market for which will be the domestic CIS market. The fourth direction of engine development is to enter the world market as a supplier of competitive aviation engines. The main emphasis in this direction is to be done at the completion of the R&D on the engine MS-500V and bringing it to the stage of readiness for serial production, and the creation of a family of engines in the class of power of 600...1000 l with, intended for installation on helicopters of different destinations with a take-off weight of 3.5...6 t. All work and expenses for the direct sale of R&D and production of the engine MC-500B within the framework of domestic Ukrainian enterprises should be financed directly from the budget. For other expenditures, which formally are not a fleet of aviation enterprises of Ukraine but which are active participants of the project, it is necessary to provide subsidies, loan guarantees and tax and customs privileges for the purpose of subsidizing primary sales of new products and forming a network of service centers by companies in the field of engine construction, providing 24/365 support at the global level.

As a result of the implementation of our measures, it is planned to achieve the following results.

1. To form a world-class motorcycle engine company "Motor Sich" with an optimal product portfolio, modernized production facilities and well-adjusted production processes that are world-class. The Ukrainian Motor Construction Corporation, "Motor Sich", will be an equal player in the international aircraft building market with the acquisition of such key features of a full player as the introduction of modern technology with the necessary key competencies formed, the delivery of components and finished aviation engines to the global market, and embedding in international programs as supplier of components of aviation engine construction of 2-4 levels. Also, the corporation generates a significant portion of the proceeds in non-aviation markets (mainly due to gas turbine installations for various industries).
2. To provide a stable positive reputation of the Ukrainian products of the engine construction industry at the global level, the main components of which are the formation on the global market of a positive history of sales of aviation engines produced by the Ukrainian motor industry, ensuring the conformity of the manufactured products with the technical characteristics to the characteristics of the world's analogues, ensuring stable sales of products as sources of sustainable profits of the engine industry, and the formation of a global service network that is effectively fundamentally does not yield to the quality of the services provided to its main competitors.
3. Provide conditions for efficient R&D on the development of new generation engines intended for use on domestic and foreign aircraft, in land and marine installations.
4. To provide domestic air-engine-building corporation control over at least 5% in the world market of civil aircraft engines and more than 10% in the global market of civilian helicopter engines.

In the field of aviation agro-engineering and instrument-making, the main areas of reform are the completion of the restructuring of companies in the field of aviation agro-engineering and instrument making, the output of the agro-industry and instrument-making industry in the world market as suppliers of whole systems and

aggregates, as well as their component level 1-4, and diversification instrumentation products on non-aviation markets.

The launch phase of the aviation instrument engineering and agro-industry sector reform is the completion of the restructuring of the industry. By analogy with the measures on aircraft engineering and engine construction, at the "zero" stage, complex analysis and auditing of the industry needs to be carried out in order to identify unnecessary and outdated assets with their subsequent closure and withdrawal from the structure of enterprises in the field of aviation agro-engineering and instrument-making.

Further, after the completion of the preparatory phase, the main tasks are introduction of modern technology and models of industrial management in aviation instrumentation and agro-industry. These tasks are divided into techno-economic and organizational-economic ones. The technical and economic tasks are the technical re-equipment of the enterprises of the branch, the completion of the transition to the digital methods of designing aggregates and systems, the acquisition of the necessary competencies through the purchase of assets in Ukraine and abroad, as well as obtaining the international certificates necessary for the normal integration into the world market of aviation aggregates instrument making. The technical and economic tasks are solved by the classical target financing, but the financing of the solution of these tasks must be carried out in combination – both with the attraction of budget funds and using non-budget sources. Provision of state budget investments is associated with the holding of enterprises for the optimization and modernization of assets carried out without the involvement of budget investments, such as holding an IPO and increasing the participation of private equity in the share capital of companies in the field of aircraft instrumentation, and the introduction of a system of target indicators for growth cost of the company (EVA, ROA, ROIC).

The organizational and economic tasks are introduction of the newest technologies of quality control in the production process, and improvement of the commercial component of the sale of finished products, which is one of the drawbacks of the domestic aviation aggregate and instrument making. The first step is to optimize production processes and introduce advanced systems of quality control and management (Lean Six Sigma, etc.) at the enterprises of the aircraft industry. The next step is to change the marketing system in the field of aggregating and instrumentation in "Antonov" Corporation with the transition to a management structure with 9 divisions, 6 of which will concentrate on aviation products with leading aircraft manufacturers ("Antonov", Boeing, Airbus, "Embraer", "Bombardier", "UAC"), one division will focus on defense systems of the Ministry of Defense, one division – on after-sales service with major aircraft operators and other clients, and one division will focus on non-aeronautical products. Airborne divisions will combine from 2 to 4 product lines (systems), each division is the only center of responsibility for product lines throughout the chain of cost creation from product development to its delivery to the client and warranty service, which will enable the strategy to build the competence of the integrator and supply systems in the collection.

The task of the enterprises of the field of agro-industry and instrument-making on the world market as suppliers of whole systems and aggregates, as well as their components level 1-4 is solved by creating a joint venture with a foreign producer of aggregates and devices, reducing the price of products due to targeted state support and revision of the model a series of non-aeronautical products to achieve the effect of synergy and the effect of scale in the production of aviation components and the reduction due to this cost of production, as well as embedding international programs at vendor level 2-4 with the terms of the distribution of risk (risk sharing) under the conditions of state guarantees with the participation of domestic companies in international programs in the division of risk.

The third area of the reform of the field of aviation agro-engineering and instrument-making – diversification into non-aviation markets – relates only to instrument making, the main direction of diversification of which is a military segment. The state should form a state defense order with the maximum orientation on the use of devices of Ukrainian aircraft manufacturers, which requires comprehensive research into the possibility of installing these devices on non-aviation military personnel and the scope of work for their successful establishment, defense orders for airline companies are financed directly from the budget.

Realization of the proposed solutions will allow to achieve the following results in the field of aviation agro-engineering and instrument-making:

1. Formation on the basis of "Antonov" Corporation of the global competitive industry of agro-industry and instrument-making of world-class with the optimal product portfolio, modernized production facilities and adjusted production processes in accordance with the world level, as well as with the necessary key competencies of the integrator level 1, active participant in international programs as a supplier of 2-4 levels, which will also ensure the synchronization of the release of avionics with the implementation of final integration projects (avionics for An-148 \ 158, An-70 and other FDPs and UAVs). At the same time, "Antonov" Corporation will be able to receive a substantial part of the proceeds on non-aviation markets, allowing to achieve the scale effect in the production of aircraft aggregates and systems.
2. Ensuring a stable positive reputation of the products of the aviation agro-industry and instrument-making industry of Ukraine at the global level by forming on the global market a positive history of sales of aviation aggregates, devices and systems produced by enterprises of the industry, ensuring the conformity of products with world analogues and market requirements, as well as formation of global service a network that operates efficiently and does not yield to the quality of the provided services to its main competitors.



The main directions of improving the organization of the functioning of domestic aviation science and technology are to create an effective system of interaction between scientific institutions and industry and to improve the management mechanism of scientific research. Creation of an effective system of interaction between scientific institutions and industry is provided in two directions: introduction of amendments to the current legislation of Ukraine, and improvement of the basic principles of the work of the scientific and technological complex of aircraft construction. Correction of the current legislation provides for the establishment of a system of compulsory assessment of the scientific and technical level and the level of readiness of technologies in the development and modernization of aviation engineering and the provision of such an assessment of the status of mandatory. Also, the priority is given to access to the experimental and landfill facilities for the aircraft industry. Measures to improve the basic principles of the scientific and technological complex of aviation engineering include a preparatory phase in which the coordination of the topics and directions of the NDR on the creation of the NTS with state target programs and the coordination of the topics and content of the work on the creation of the NTS with the activities of technological platforms and innovative territorial clusters is ensured, with these measures are coordinated with the state plan for the training of scientific workers and specialists for the defense industry complexes. The result of the preparatory phase is the formation of the main document of the development of domestic aviation science and technology – the Plan for the development of science and technology in aircraft construction, as well as the associated plan of the NDR and the plan for the development of experimental and landfill base.

The main directions of improving the mechanism of management of scientific research work on the priority directions of the development of aviation science and aviation technologies in modern conditions is the use of the model of a comprehensive scientific and technological project and the opening of research in the field of system integration of technologies. Complex scientific and technological projects are research works that include various types of scientific research (fundamental and research studies, applied research, experimental research), as well as (if necessary) related work (research and development works, technological works), aimed at achieving common goals and / or solving common tasks. The results of these studies are technologies that are at the level of readiness 5-6. Comprehensive scientific and technological projects are a key element that ensures the interconnection between the long-term (strategic) planning system of the creation of the NTS (Aerospace Development Plan, the NDR plan and the development plan of the experimental and landfill base) and its practical implementation through the creation of advanced aviation technologies. The formation of complex scientific and technological projects is carried out jointly by science and industry: as a result of strategic planning and scientific and technical forecasting and search engine research, resulting in determined directions and "breakthrough" technical solutions requiring deeper and more detailed elaboration; on the other hand, it formulates the requirements of potential customers for possible features of promising aviation equipment and its components. The criteria for the formation of a complex scientific and technological project are the obtaining of significant scientific and technological decisions, which allow to rely on considerable improvement of tactical or technical and economic characteristics of perspective or existing aviation techniques, as well as the value, which is determined by the requirements of the market and (or) potential customers. Formed integrated scientific and technological projects are implemented within the framework of the Plan for the development of science and technology in aircraft construction, as well as associated with the NDR plan, their management and their financing are carried out centrally through relevant state targeted programs. The implementation of a comprehensive scientific and technological project is carried out jointly by science and industry.

The second direction of improving the implementation of research works is the discovery of research in the field of system integration of technologies, which involves carrying out works aimed at the systematic integration of developed and demonstrated technologies, starting with the 4th and 5th level of technological readiness, providing a substantiation of the form and integral indicators of efficiency and quality excellence new models of aviation equipment, the creation of which is possible on the basis of demonstrated technologies. Research in the field of system integration of technologies is conducted with the aim of managing the creation of a scientific and technical division in the field of aircraft engineering and includes multidisciplinary design and formation of perspective models of aviation engineering, coordination and management of the implementation of integrated scientific and technological projects, including assessment of the level of preparedness of technologies, continuous monitoring the results of search and fundamental research in order to prepare proposals for the formulation and implementation of the complex science and technology projects and organization of interaction between science and industry in the formation of advanced aircraft construction and implementation of projects / programs.

Separately, we have developed a set of decisions and measures on the role of the state and mechanisms for its regulation in the conditions of Ukraine's accession to the WTO, when the possibilities of the state in the areas of direct financing of the field of aircraft construction are significantly limited, and the priority mechanisms of state regulation should be indirect and mediated.

As the main mechanism for state financing of the aircraft industry, we are offered a mechanism for reciprocal financing, which is widely used abroad. At the heart of the mechanism of reciprocal financing is the method of funding on a two-tier basis: the first level – the indicative amount of funds allocated to the program as a whole, the second level – protected funds allocated for the current stage of work on the results of passing the corresponding boundary of quality, the results of which are evaluated external (market) and internal changes

(degree of "promotion" of the program). Accordingly, an integrated reassessment of the project is carried out and decisions are made on the amounts and timing of further financing. The conditions for the provision of funds in the framework of the re-financing of aviation industry are the adequacy of the budget coverage of R&D and production costs, long-term lending, the integral effective rate at the level of interest rates, the differentiation of interest rates, the granting of a deferral for payment of principal, commissions and interest until the moment the receipt of the last tranche of the turnaround financing or the moment of the first delivery, the debt of the aircraft building company is calculated on the basis of the agreed sales plan, the scale of the growth of repayment is tied to the supply-side agreed with the state of the business plan. The main advantage of the reverse financing mechanism is to maintain a strong market incentive for aviation industry companies. Implementation of the system of re-financing in Ukraine needs to be finalized in accordance with the Budget Code of Ukraine.

In the area of adjusting the mechanisms of state regulation in accordance with the requirements of the WTO we are offered the following decision:

1. Subsidization of interest rates on a loan for the purchase of Ukrainian aviation products. A potential buyer (leasing company, airline, aviation company) of Ukrainian aviation products applies to the commercial bank, which in turn signs an agreement on reimbursement of interest with the National Bank of Ukraine, which is the operator of the program for the recovery of interest rates. The National Bank of Ukraine informs the Ministry of Finance of Ukraine, which allocates the necessary funds from the state budget to the agency account of the NBU. After that, the NBU conducts a transaction to repay the commercial bank's loan rates to the CIRR (Commercial Interest Reference Rate). As a result, a commercial bank issues a loan to the buyer at a CIRR rate. In all cases, the implementation of the mechanism for compensation of bank interest is possible only under the terms of insurance risk of non-repayment of credit from the buyer by a national bank or insurance agency, and in case of a foreign buyer – a national export agency. At the same time, the insurance premium according to AOEC (Agreement on official export credits of OECD) must be not less than the corresponding MPR (Minimum premium rate).
2. Provision of state guarantees of residual value of domestic aircraft. The Ukrainian aviation manufacturer (guarantor) provides the recipient with state guarantees of residual value (airlines, leasing companies, bank lenders), which in the agreement agreed on in the contract terms of the guarantee in the performance of all operating conditions, aircraft technology can be sold on the market at a price not lower than specified in the contract. In the other case, the Guarantor compensates for the difference between the sale price and the guaranteed price, but no more than the contract stipulated by the contract or redeems the PS at the price stipulated in the contract. The NBU acts as a guarantor of the warranty manufacturer in case the guarantor can not fulfill its obligations under the guarantee of residual value for reasons of financial insolvency.
3. State compensation of the cost of servicing credits received by Ukrainian aircraft producers after 2014: the state should open a new direction of subsidization – compensation of the cost of servicing credits received by Ukrainian aircraft manufacturers after 2014.
4. Financial support of the Ukrainian aircraft manufacturer in the initial stages of entering the markets: the new direction of state subsidies should be the comprehensive financial support of the Ukrainian aircraft manufacturer in the initial stages of entering the world markets until they have a stable position.
5. Subsidization of programs for the utilization of aircraft of domestic production. On the fact of utilization of the PS, the responsible aircraft operator (air carrier, leasing company or investment fund) receives the certificate of utilization of the aircraft, which has become exploitation, which it transfers to the seller (lessor) receiving a subsidy from the state on the basis of reporting, including the certificate of disposal PS.

We also propose a two-level methodology for assessing the effectiveness of these measures for the development of domestic aircraft construction, in which the first level assesses the achievement of general directions, and the second – the effectiveness of the implementation of specific individual measures.

## Conclusions

We offer a set of measures to ensure sustainable and qualitative development of the aircraft industry in Ukraine and its integration into the world aircraft construction industry under the conditions of minimal budget financing, a tough competitive market and adherence to the requirements of accession to the WTO. The proposed measures are differentiated by the main components of the aircraft industry: aircraft engineering, aircraft engineering, aeronautical aggregate and instrumentation, and aviation science and technology. Separate measures have been developed to provide state support to the domestic aviation industry in compliance with the terms of the WTO.

## Abstract

The article is devoted to reforming the aviation industry of Ukraine to attest the international level. It was elaborated the complex of measures to ensure the conditions for the development of the Ukrainian aircraft manufacturing industry and its integration into the global aircraft manufacturing industry with the measures in the sphere of aircraft construction, aircraft engine manufacturing, aircraft aggregate and instrument manufacturing, aviation science and technology. The main directions of development is structural reform of the aircraft industry and its adaptation to international standards and integration into the world system of cooperation

in the aviation industry. The focus of the development of measures is the principle of minimizing of government funding and the use of indirect mechanisms of state stimulation of development of aviation manufacturing industry. In the sphere of aircraft construction it is proposed the two-phases model of structural reforming, complex of measures for transition to the new industrial model, and set of aviation industry state financial maintenance of transition to the new industrial model. In the sphere of aircraft engine manufacturing it's proposed the two-phases model of structural reforming, mechanisms of aviation industry state financing of transition to the new industrial model, the set of measures to ensure the entrance of Ukrainian aircraft engine manufacturing industry to the global market and integration into the world aircraft manufacturing co-operation system. In the sphere of aircraft aggregate and instrument manufacturing it's proposed the two-phases model of structural reforming and set of measures of entrance of Ukrainian engineering and instrumentation industry into the world market as suppliers of whole systems and assemblies and their components 1-4 level. In the sphere of aviation science and technology it's proposed the measures on creation of effective system of interaction between academia and industry and measures to improve the implementation of research and development on priority directions of development of aviation science and aviation technologies. Separately it was elaborated the set of solutions to improve the state regulation of the aircraft manufacturing industry according to the requirements of the WTO.

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