RUSSIAN AERONAUTICS RESEARCH PROGRAMMS

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Russian Federation
1. Development strategy for aircraft industry through 2015.


1. The consolidation of fixed assets is completed

2. Corporate strategies were accepted, conversion of main establishments, and work for cooperation optimization

3. Production program is oriented on the priority market segments

4. The mechanisms of state supporting are improving
General characteristics of aviation industry in Russia

- 214 establishments and organizations, 103 of which are industrial, 102 Research institutes and experimental design offices.
- Total number of employees – more than 411 thousand people;
- Leading scientific centres: TsAGI, CIAM, VIAM, LII, GosNIIAS, ORPE “Technologiya”

Currently, in whole, the process of consolidation of fixed industry assets is completed in frames of profile-integrated structures (corporations):

- In 2010 р. Total receipts of aircraft construction industry amounted to more than 504 bil. roubles
- Key corporations – maintain nearly 90% of total value of industry production

Unit weight of production volume in 2010

- Aircraft construction 31,1%
- Helicopter engineering 18,2%
- Propulsion engineering 23,6%
- Propulsion module engineering 7,9%
- Instrument engineering 11,1%
- Special engineering 8,1%

United Aircraft Corporation (UAC) JSC

United Industrial Corporation OBORONPROM, JSC:
- «Russian helicopters», JSC
- «United Engine Corporation Managing Company», JSC
World-class research centers:

TsAGI – The Central Aerohydrodynamic Institute n.a. N.E. Zhukovsky
CIAM – The Central Institute of Aviation Motors
GosNIIAS – The State Aviation Systems Research Institute
VIAM – The Institute of Aviation Materials
TsAGI ACTIVITY TOWARDS CREATION OF ADVANCED TECHNOLOGIES

- Aeroacoustics
- Aerothermodynamics & Gas Dynamics
- Aerodynamics & Hydrodynamics
- Aircraft Certification & Flight Testing
- Aircraft Propulsion
- Aircraft Strength & Structures
- Alternative Energy Sources
- Atmospheric & Environmental Research
- Air Traffic Management
- Experimental Facility Development
- Flight Dynamics & Control Systems

- Flight Simulation & Pilot Training
- Industrial Propellers & Fans
- Lasers & Optics
- Holography
- Microwave Technology
- Plasma Physics
- Precision Manufacturing
CIAM ACTIVITY TOWARDS CREATION OF ADVANCED TECHNOLOGIES

GOALS:
- To increase fuel effectiveness
- To reduce noise
- To lower emission levels

TECHNOLOGIES:
- New engine and power unit schemes
- Enhancement of engine operational parameters
- Super high bypass ratio
- Reduction of noise in the far field
- Highly loaded bladed machines with low number of blade rows
- Low emission combustion chambers
- Intensification of combustion
- Variable nozzles
- Distributed automatic control systems, including wireless systems
- Electric engine
- Alternative fuels
- Smart health diagnosing systems
- Reliability and faultlessness
- Low cost of product development, manufacturing and maintenance
GosNIIAS ACTIVITY TOWARDS CREATION OF ADVANCED TECHNOLOGIES

- Integration and improvement of complexes of radio electronic airborne equipment and arms of airplanes and helicopters
- Analysis of efficiency, formation of shapes, types and parks of aviation complexes and external designing
- Program – algorithmic support of onboard computing systems
- Development of onboard and ground systems of data support
- Development of avionics
- Remote sensing, construction of digital maps of terrain
- Satellite navigation, data transmission and surveillance in systems of air traffic management
- Methodical and information support of flight tests
- Computer technologies of special purpose
- Industrial technologies and pilot production
VIAM ACTIVITY TOWARDS CREATION OF ADVANCED TECHNOLOGIES

- VIAM is the largest materials science state enterprise that has been developing materials outlining the aerospace engineering products over 78 years.
- VIAM fills development and delivery customer orders on a wide range of products: metallic and non-metallic materials; coatings; technological processes and equipment; corrosion-preventive measures; quality control methods of raw products, semiproducts, and items thereof.
- VIAM modifies and applies its developments to diverse task solutions in various industrial spheres: machine building, power engineering, and medical engineering, transportation, and construction, etc.
Aircrafts Sukhoi Superjet 100 (SSJ) are capable of transporting 98 passengers at the distance of more than 3000 km (basic model) and more than 4500 km (with modification for extended distance).

Produced on the basis of wide transnational cooperation (Italy, France, Germany, USA and others). Strategic partner – Alenia Aeronautica (Italy)

The unique family of regional aircrafts, offering the level of comfort that can be compared to haul aircraft.

Family of SSJ aircrafts conforms to modern and perspective requirements of Russian and worldwide aircraft market of civil aviation.

Submitted 170 orders, including hard contracts – 107

Development of SSJ NG is in progress (130 seats)

In whole for project was spent – 34,7 bil.rubles., from which federal budget is – 15,6 bil.rubles

Number of flights – 1093 (2594 hours), from which – 772 were certified
The breaking project of Russian aircraft industry

Implementation of innovations will provide MC-21 with best technical characteristics among aircrafts of its category: 25% improvement of fuel economy, 15% decrease of maintenance costs, new level of ecological safety.

Distinction from analogues: aircraft weight reduction (utilization of composite materials and perspective metallic alloys in combination with integration of avionics of new generation); ultimate aerodynamics; employment of perspective engines.

There are 50 hard contracts for aircrafts already.
Ministry of Industry and Trade of RF supports research through the Federal Target Programme mechanism


- Main lines of research through 2015:
  - Aircraft 2020
  - Perspective wing
  - Composite materials and high-strength alloys
  - Integrated module avionics of new generation
  - Vortical safety
  - Integrated logistic support for aeronautical engineering
  - New generation ecological engines with higher efficiency
Russian Federal Target Program “Development of Russian Civil Aviation for 2002–2010 and through 2015”

Funding of national research and D&D projects;
Topics selection via tenders;
Key selection criteria:

- duration of the proposed work,
- budget requested,
- professional qualification of the applicants including their experience and solid background in the area of proposed research,
- quality characteristics of the proposed project.
CO-ORDINATED CALL  EU – Russia

Call name: FP7-AERONAUTICS and AIR TRANSPORT (AAT)-2010-RTD-RUSSIA

Open date: 30 July 2009 (EU) / 26 May 2010 (Russia)

Closing date: 14 January 2010, 17:00 CET (EU) / 28 June 2010, 10:00 (Russia)

Estimated budget:

✓ EC budget – 4 Mil. Euro:
  ➢ Participants from the side of EC and Associated countries;
  ➢ More than 5% reimbursement of eligible costs of Russian participants;

✓ Budget form Russian side – 4 Mil. Euro:
  ➢ Call for russian participants is being funded by Department of aircraft industry in Minpromtorg;
  ➢ Call is being held on the russian territory under the national law of Russian federation/
COORDINATED CALL EU–RUSSIA

Projects that passed the selection by results of the call

- **SVETLANA** – Safety (and maintenance) improVEment Through automated fLight data ANAlysis
  
  AAT.2010.3.4-6. Enhancing strategic international co-operation with Russia in the field of enhanced maintenance and operational safety

- **ORINOCO** – Instability Waves are one of the Recognized Mechanism for Noise Generation in High Speed Hot Jets
  
  AAT.2010.1.1-7. Enhancing strategic international cooperation with Russia in the field of advanced engine noise control based on plasma actuators

- **ALaSCA** – Advanced Lattice Structures for Composite Airframes
  
  AAT.2010.4.1-6. Enhancing strategic international co-operation with Russia in the field of novel composite structures and associated manufacturing methods based on geodesic concepts
SVETLANA Objectives

- Offer a systematic flight data analysis process
  - On a large amount of data from every flight
  - Improving FDM processes aiming at detecting almost all flight operations events
  - With minimal/no additional workload effort for experts

- Propose SVETLANA as a standardized data analysis process
  - For a harmonized integration into various operators’ systems
  - On a wide range of existing aircraft types
  - For operational safety improvement both in the EU and in the Russian Federation
  - That has acceptance in the EU and the Russian Federation for a European-wide Aviation Area

- Offer additional benefit for enhanced maintenance
  - More insight into abnormal events, supported by prediction and early detection capabilities
ALASCA

LATTICE TECHNOLOGY FOR CIVIL FUSELAGE STRUCTURE

ADVANTAGES OF LATTICE TECHNOLOGY:

- Real weight saving for rocket airframe – 25–40%
- Expected weight saving for fuselage structure – 15–20%
- Expected cost reduction of fuselage structure – 30–35%

STRUCTURE OF THE PROTOTYPE

NEW PRO-COMPOSITE AIRCRAFT CONCEPT
ORINOCO

Improve Plasma Actuators Concepts for Jet Noise Reduction

LIST OF PARTICIPANTS

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<th>Country</th>
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<tr>
<td>1 (European Coordinator)</td>
<td>ONERA (CN)</td>
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EXPERT PANEL

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<td>Expert 6</td>
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Thank you for your attention!