



RUSSIAN AERONAUTICS RESEARCH PROGRAMMS

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Programme documents for aircraft industry and its lines of development

- Development strategy for aircraft industry through 2015.
- Federal target programme
 "Development of Russian civil aviation for 2002– 2010 and through 2015"

- 1. The consolidation of fixed assets is completed
- 2. Corporate strategies were accepted, conversion of main establishments, and work for cooperation optimization
- Production program is oriented on the priority market segments
 - 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 r. Total receipts of aircraft construction industry amounted to more than 504 bil. roubles

 Key corporations – maintain nearly 90% of total value of industry production







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.









SSJ-100

- 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











MC-21

- ★ 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

- Federal Target Programme "Development of Russian civil aviation for 2002–2010 and through 2015".
- 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:

Open date:

Closing date:

Estimated budget:

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

30 July 2009 (EU) / 26 May 2010 (Russia)

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

- \checkmark 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

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				Participant Number	Participant organisation Name	Country
				1 (European Coordinator)	ONERA (ON)	France
ORINOCO				2 (Russian Coordinator)	TsAGI (TsA)	Russian Federation
COoperation with Russia in the field of advanced engine NOise COntrol based on plasma actuators F. Cléro - Onera V. Kopiev - TsAGI				3	AVIADVIGATEL OJSC (AVIADVIGATEL)	Russian Federation
				4	CIAM (CIAM)	Russian Federation
				5	CIRA S.C.p.A (CIRA)	Italy
				6	GPI RAS (GPI RAS)	Russian Federation
				7	IVTAN (IVTAN)	Russian Federation
				8	CNRS (CNRS)	France
ONERA				9	ECL (ECL)	France
THE FRENCH AEROSPACE LAB				10	NLR (NLR)	Netherlands
retour sui					TRINITI (TRINITI)	Russian Federation
Expert Number Participa		ant organisation Name	Country	UNIROMA TRE (UNIROMA TRE)	Italy	
				country	ERDYN CONSULTANTS (ERDYN)	France
	Expert 1	ALENIA AERMACCHI		Italy		
Expert 2 AIRBUS Expert 3 BERIEV Expert 4 SNECM Expert 5 SUKHOI Expert 6 TUPOLE		AIRBUS		France		
		BERIEV		Russian Federation		
		SNECMA		France		
		SUKHO		Russian Federation		
		EV	Russian Federation			





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Thank you for your attention!



AERODAYS 2011 MARCH, 31ST, MADRID