ЦАГИ ЦЕНТРАЛЬНЫЙ АЭРОГИДРОДИНАМИЧЕСКИЙ ИНСТИТУТ ИМ. ПРОФ. Н.Е. ЖУКОВСКОГО

AVIA INVEST INTERNATIONAL CONFERENCE 2014

NATIONAL CONTACT POINT AERONAUTICS

НАЦИОНАЛЬНАЯ КОНТАКТНАЯ ТОЧКА АЭРОНАВТИКА

Joint Research Projects of the EU and Russia in the Field of Aeronautics

Alexey Kargopoltsev

Head of department, Central Aerohydrodynamic Institute (TsAGI), Russia

International Conference AVIA INVEST

10—11 April, 2014 • Riga, Latvia

TsAGI INTERNATIONAL COOPERATION

TsAGI — NATIONAL CONTACT POINT

NATIONAL CONTACT POINT AERONAUTICS НАЦИОНАЛЬНАЯ КОНТАКТНАЯ ТОЧКА АЭРОНАВТИКА

In 2004 TsAGI was appointed National Contact Point for aeronautics research (NCP Aeronautics) and since then it has been working to provide information, consulting and methodological assistance for international cooperation development between Russian and European research organizations under 6th, 7th Framework programs and continues its activities in the frame of Horizon 2020.

General provisions

1. NCP on aeronautics research is a part of RF—EU cooperation support within the Framework Programs of technological development.
2. The main NCP's mission is the informational and advisory assistance in research cooperation to the Russian research teams participating in the international FP consortiums as well as preparation of the proposals promoting the cooperation with the European Commission.

TsAGI — FOCAL POINT FOR X-NOISE PROJECT

X-Noise

The X_NOISE project meets the tasks in the field of noise set in today's aviation industry, namely:

- Assessment of European projects and of their contribution in current situation.
- Formulation of priorities and key topics for future projects.
- Ensuring of dissemination and usage of the findings of investigation.
- Improvement of integration within European Aviation Noise Research Associations by means of work of a system of national focus points.
- Determination of potential reinforcement of consortia of future projects by means of work of the system and of actions aiming at creation and promotion of new ideas and connections.

TsAGI participation:

- Organization of the Annual Russian Workshop on Acoustics.
- Creation of websites meant for informing of functioning of X-noise Group.
- Provision the press with information as well as distribution of information about calls devoted to new ideas and concepts.
- Creation of a roadmap of national programmes.

TsAGI's PARTICIPATION IN EUROPEAN ASSOCIATION

- TsAGI is associate member of Association of European Research Establishments in Aeronautics (EREA)
- TsAGI is admitted to Council of European Aerospace Societies (CEAS)
- TsAGI is member of European Aeronautics Science Network (EASN)

FP PROJECTS WITH TsAGI PARTICIPATION

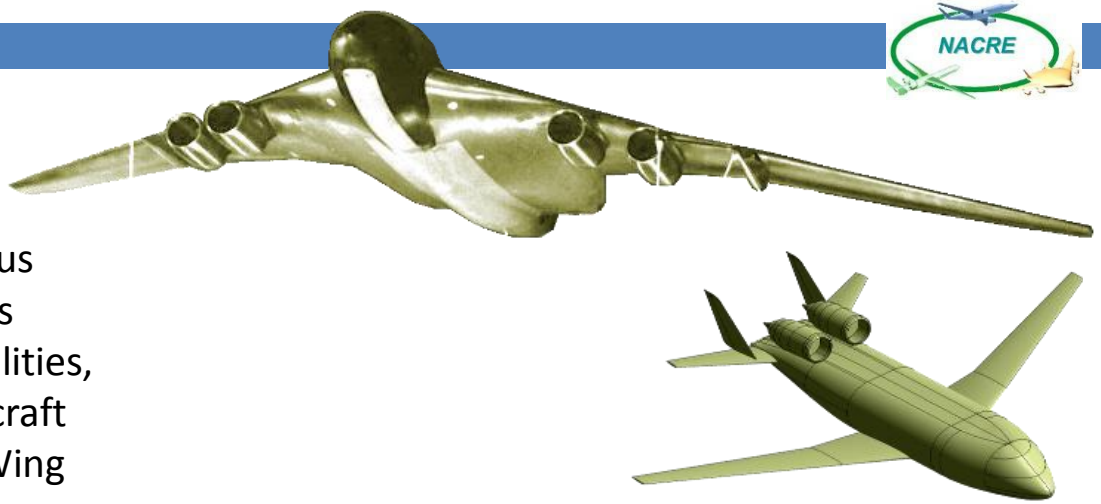
AVIA INVEST INTERNATIONAL CONFERENCE 2014

Trends in aircraft performance

- SAFETY (incidents/accidents per flight)
- EFFICIENCY (cost)
- ENVIRONMENTAL ISSUES (noise, emission)
- PERFOMANCE (cruise speed, range)

NEW AIRCRAFT CONCEPTS RESEARCH

NACRE



TsAGI's role in the project:

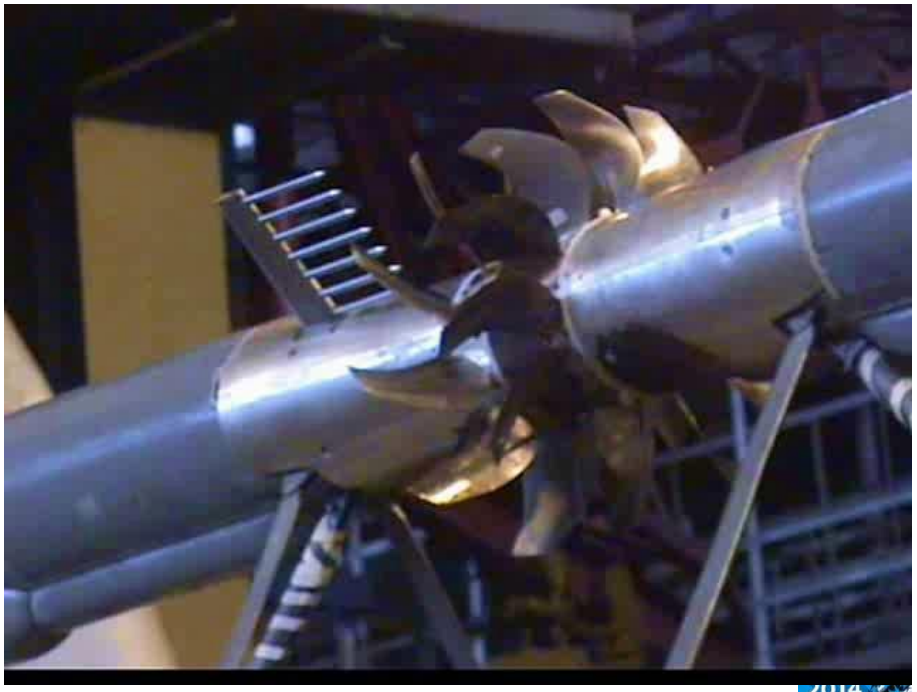
- Baseline PDA configurations
- Investigation of the Flying Wing various aspects, including the control surfaces numerical investigation, handling qualities, concepts of design of Flying Wing aircraft family, structural concepts of Flying Wing and its pressurized section.
- Contribute to numerical and experimental engine burst protection investigation.
- Contribute to numerical optimization of advanced and wide-body fuselage structures.

AVIA INVEST INTERNATIONAL CONFERENCE 2014

OPEN-ROTOR TESTING FOR THE EU PROJECT DREAM

DREAM — valiDation of Radical Engine Architecture systeMs

Aero-acoustic test in TsAGI's WT



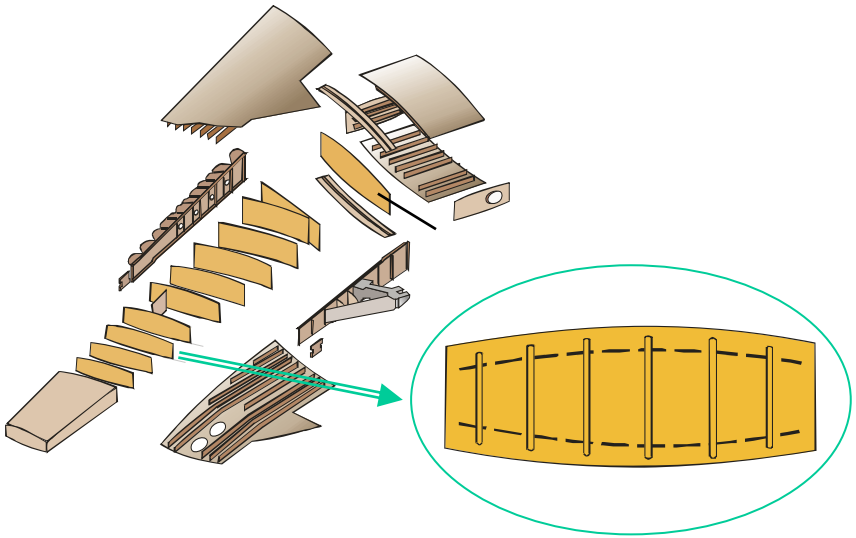
DREAM objectives:

- CO_2 — 7% better than ACARE goals or 27% better than Year 2000 engine
- Noise — 9 dB cumulated on 3 cert points versus the Year 2000 engine
- NO_x — will be reduced accordingly with engine specific fuel burn reduction

COMPOSITE MATERIALS STRUCTURES

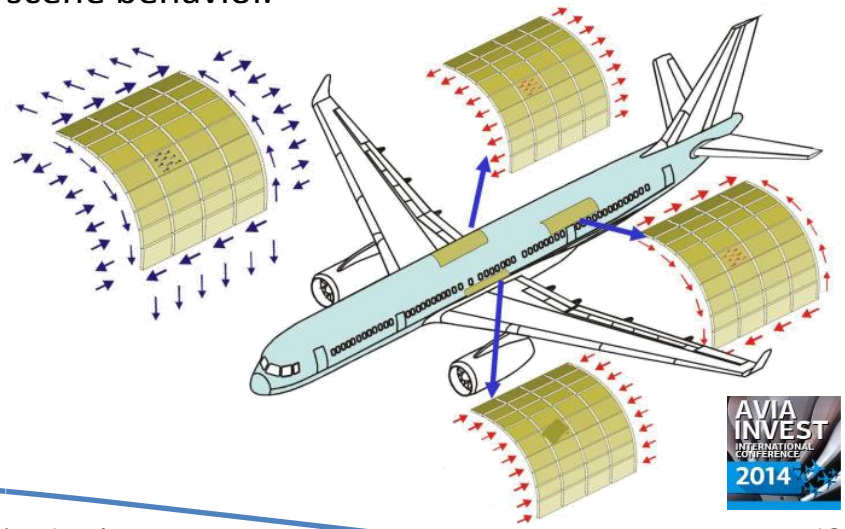
Advanced Low-Cost Aircraft Structures

- Within ALCAS TsAGI studies the post buckling behavior of stiffened composite structures.



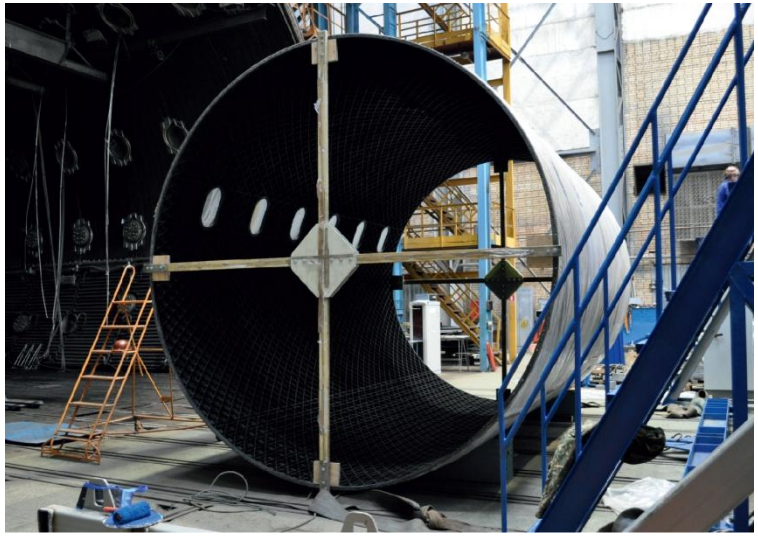
More Affordable Aircraft structure life cycle through Extended, Integrated & Mature Numerical Sizing

- Development of the calculation algorithm of the composite fuselage strength and weight parameters taking into consideration nonlinear scene behavior.



ADVANCED LATTICE STRUCTURES FOR COMPOSITE AIRFRAMES

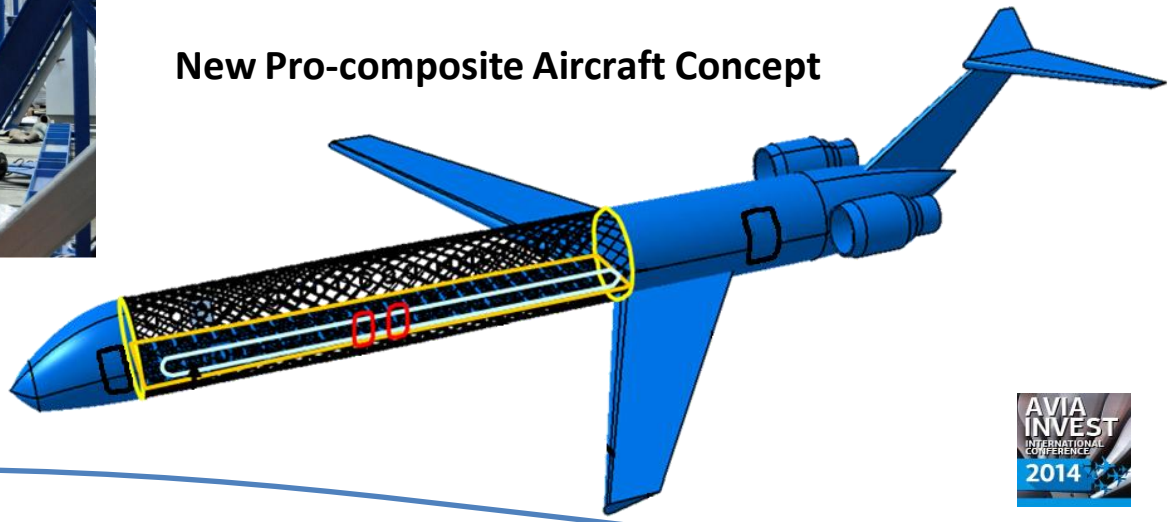
Prototype Structure



Advantages of Lattice Technology:

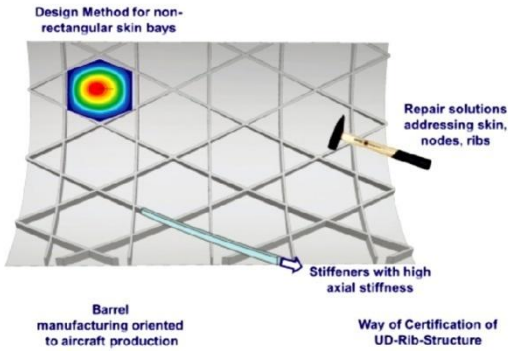
- Real weight saving for rocket airframe – 25–40%
- Expected weight saving for fuselage structure – 15–20%
- Expected cost reduction of fuselage structure – 30–35%

New Pro-composite Aircraft Concept



Coordinated call

PoLaRBEAR — PRODUCTION ASPECTS OF LATTICE RELATED BARREL ELEMENTS WITH ADVANCED RELIABILITY

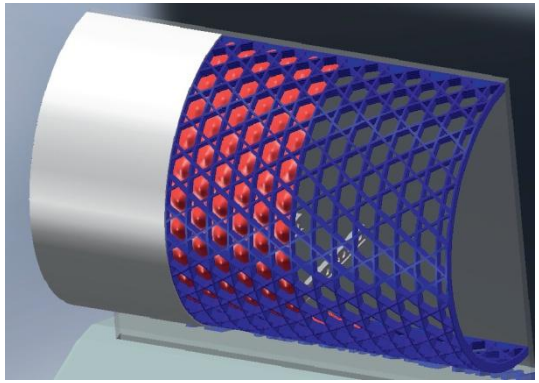


Project Coordinator: TsAGI (Russia), DLR (Germany)

POLaRBEAR project focuses on the reliable novel composite aircraft structures based on geodesic technology aiming at significantly higher Robustness and Technology Readiness Level (TRL).

POLaRBEAR approach and objectives:

To increase the technology readiness level of the innovations addressed in ***EU–ALaSCA,*** further analyses are necessary on local level.

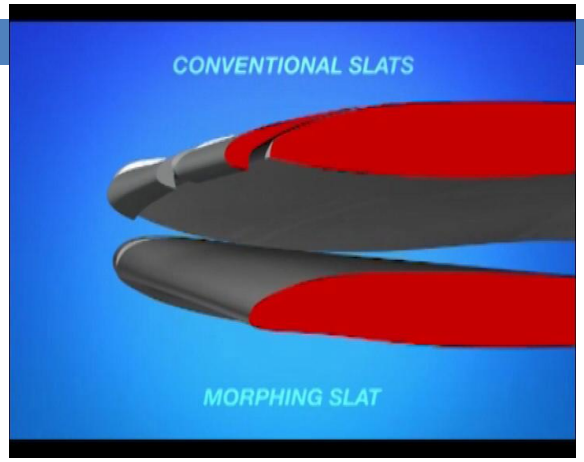


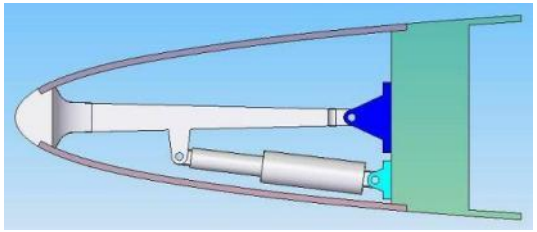
The main objectives of this research program are:

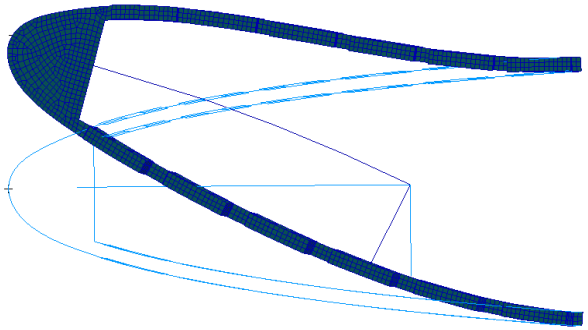
- Design rules for robust grid structures.
- Advanced reliability of geodesic structures under operational loads.
- Industrial highly automated process for cost-efficient barrel manufacturing.

SMART HIGH LIFT CONFIGURATION

SADE



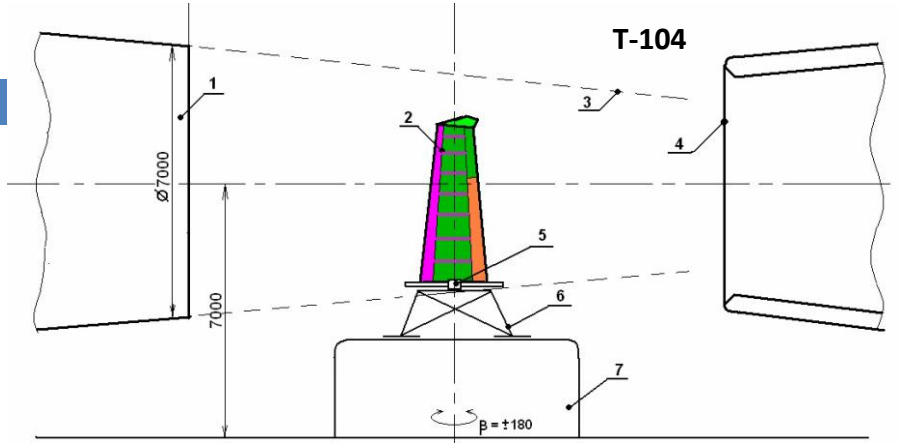




TsAGI contribution:

- Fundamental Conception of selectively deformable structures as feasible components for "smart" leading edge and "smart" one-slot wing flap for the future models.
- Theoretical research of the aeroelasticity/aerodynamics of selectively deformable and standard controls.
- Design, manufacture, rigidity and ground vibration tests of "smart" controls model, tests in T-101 Wind Tunnel (accompanied by weight measurement and optical measurements of the strain).

SARISTU "SMART INTELLIGENT AIRCRAFT STRUCTURES"

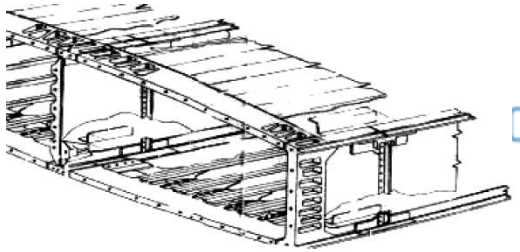


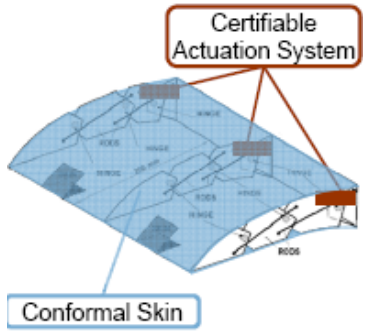
1. Nozzle
2. Model
3. Boundary layer
4. Diffuser
5. Strain gauge balance
6. Frame
7. Control cabin

SARISTU

Coordinator: AIRBUS D

- The project deals with the physical integration of smart structures' concepts. This will allow to decrease the aircraft weight and cutting operational costs and improve aerodynamic properties.
- The concepts are considered of the materials providing conformal controlled alteration of the aerodynamically significant surfaces, allowing carrying out active or passive assessment of the specific structure areas state in terms of shape and possible damage.





AVIA INVEST INTERNATIONAL CONFERENCE 2014

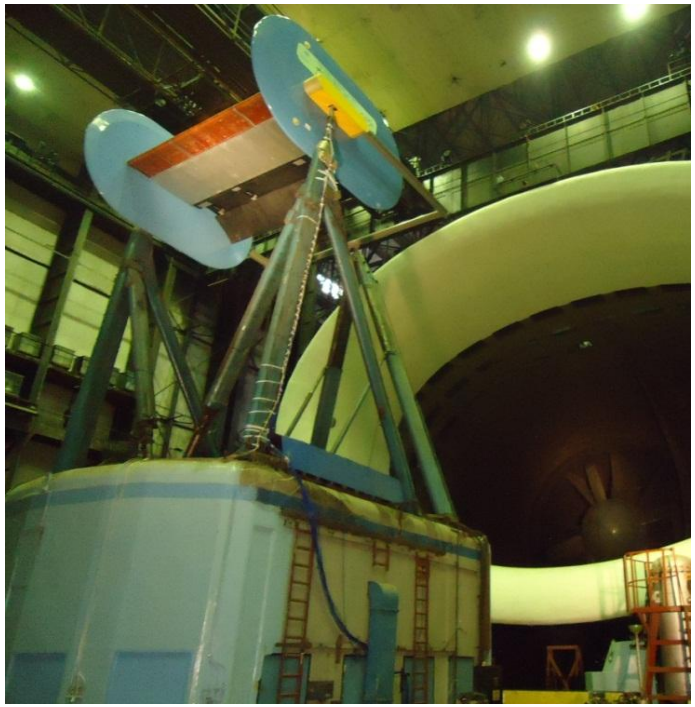
"2nd GENERATION ACTIVE WING" — ACTIVE FLOW, LOADS & NOISE CONTROL ON NEXT GENERATION WING

AFLoNext

Objectives:

To mature and demonstrate promising flow control technologies up to high maturity levels (TRL 4-5) to validate them later in a fully integrated large scale demonstrator approach such as in Clean Sky 2 (TRL 6 and higher).

- Hybrid Laminar Flow Technology (HLFT) for aircraft drag reduction,
- Active/passive flow, load and noise control technologies for local applications for performance increase and improved environmental compatibility,
- Development and assessment of AFLoNext topics as part of an integrated future wing/airframe design.



Duration of the project:
2013—2017 (4 years)

STALL AND UP-SET RECOVERY

TsAGI participation in FP7 projects:

SimSAC

SIMULATION OF UPSET RECOVERY IN AVIATION supra

- Software to assess the stability and control at initial design
- Wind tunnel tests on aerodynamic instability features of transonic cruise aircraft
- Software for flight control system synthesis

- Jet airliner expanded mathematical model that is capable to describe its behavior under high angels of attack and other critical flight modes
- Flight simulator technical specifications to simulate the aircraft up-set recovery

AVIA INVEST INTERNATIONAL CONFERENCE 2014

HIGH ALTITUDE ICE CRYSTALS
(Integrated Approach to Safe Flights under Icing Conditions)

Airframers	AIRBUS	DASSAULT AVIATION	PIAGGIO AERO	TAI	BOEING	
Engine manufacturers	Rolls-Royce	SAFRAN				
Equipments & System suppliers	THALES	ZODIAC AEROSPACE	Rockwell Collins	Honeywell	GOODRICH	
Research institutes & Univ.	NLR	CIRA	ONERA	EADS	DLR	CNRS
		UNIVERSITY OF TWENTE.	TECHNISCHE UNIVERSITÄT DARMSTADT	Cranfield UNIVERSITY		ЦАГИ
	INCAS	IRSN	INTA	NRC CNRC Canada		
Meteorology	METEO FRANCE	KNMI	Australian Government Bureau of Meteorology			
Test facilities			Esterline			
SME	ATMOSPHERE					
Management & Dissemination	ARTTIC					

HAIC High Altitude Ice Crystals

HAIC:

High Altitude Ice Crystals (Integrated approach to safe flights under icing conditions)

TsAGI participation:

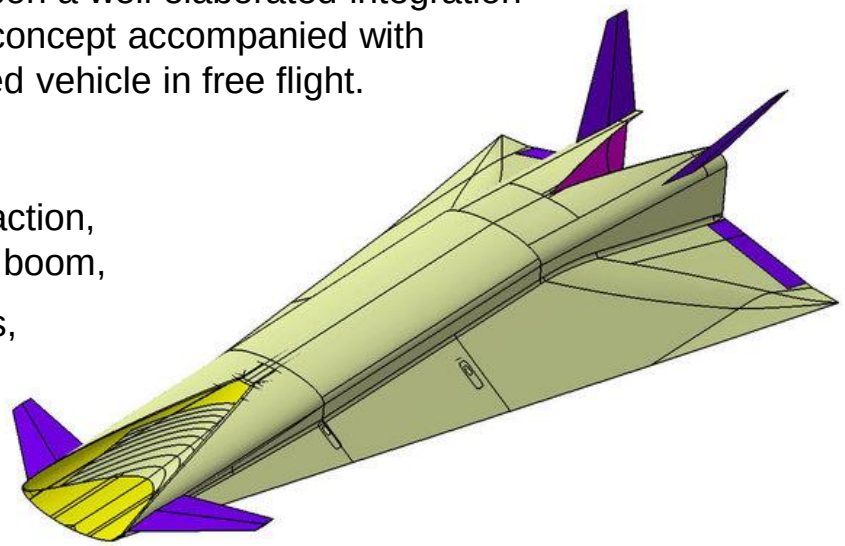
Carrying out of an experiment on an artificial icing stand.

AVIA INVEST INTERNATIONAL CONFERENCE 2014

HEXAFLY-INT — HIGH SPEED EXPERIMENTAL FLY VEHICLES —INTERNATIONAL

Overall Objective:

To test one of the radically new conceptual designs based upon a well elaborated integration of a highly efficient propulsion unit with a high-lifting vehicle concept accompanied with several breakthrough technologies on board of the high-speed vehicle in free flight.



Russian research establishment participation:

- Conceptual and numerical research on aerodynamics, traction, economic and aircraft performance characteristics, sonic boom,
- Model design, production and tests in TsAGI wind tunnels,
- Verification and adaptation of computation methods and programs,
- Production, mount and delivery of an experimental demonstrator aircraft (without engine) and an adapter module ESM for flight tests.

European Consortium

Russian Federation Consortium

Australian Consortium

SPACE PROJECTS

TsAGI participation in FP7 projects:

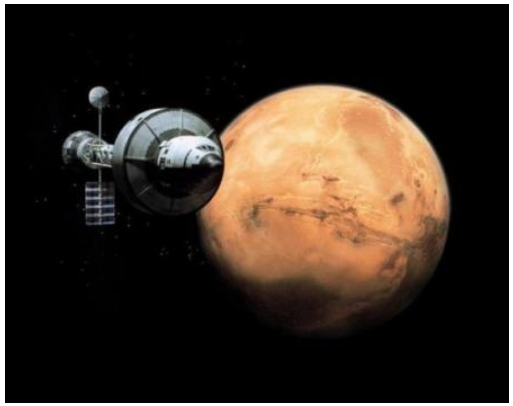
SacoMAR

Project's objectives:

- Technologies for Safe and Controlled Martian Entry

TsAGI role in the project:

- Experimental study in TsAGI's hot shot wind tunnel IT-2 for the verification of the numeric codes



TransHyBeriAN

Project's objectives:

- Characterization of Wall Temperature Effect during Transition of Hypersonic flow over a Cone By Experiments And Numerical Simulations

TsAGI role in the project:

- Prediction with thermal control based on unsteady solutions (DNS) and stability (eN). Full 3D and temporal evolution of the boundary level with TsAGI DNS code.

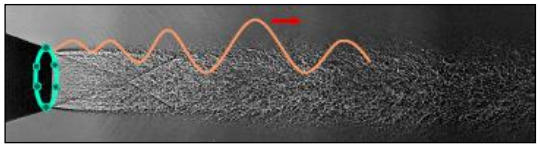
ORINOCO — IMPROVE PLASMA ACTUATORS CONCEPTS FOR JET NOISE REDUCTION

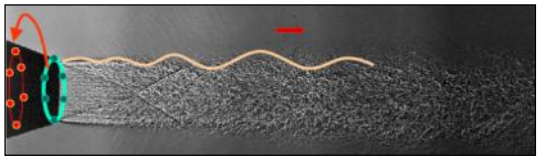
ОРИНОКО
ORINOCO

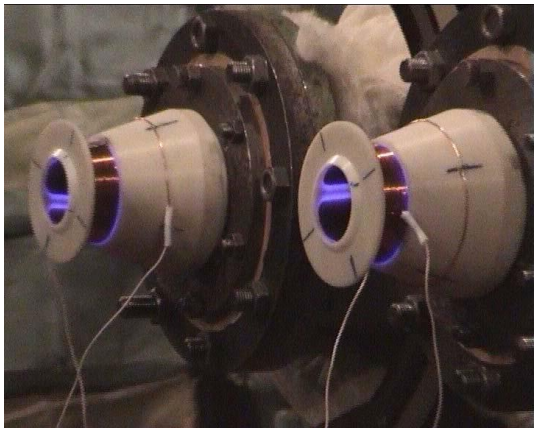
The following challenges are to be solved:

- Development of plasma actuator application technology for jet noise reduction.
- Development of instability waves concept as a basis for active jet noise reduction system.
- Elaboration of a new jet noise control strategy based on obtained gas-dynamic characteristics of plasma actuators.
- Creation of a laboratory prototype of jet noise reduction system based on plasma actuators application.

Improve Plasma Actuators Concepts for Jet Noise Reduction







AVIA INVEST INTERNATIONAL CONFERENCE 2014

ICAS 2014

WELCOME TO SAINT PETERSBURG




29th Congress of the International Council of the Aeronautical Sciences
ICAS 2014

Saint Petersburg, Russia • September 7–12, 2014

AVIA INVEST INTERNATIONAL CONFERENCE 2014

IFASD 2015

Welcome to the International Forum on Aeroelasticity and Structural Dynamics

Saint Petersburg, Russia • June, 2015

THANK YOU FOR YOUR ATTENTION!

1, Zhukovsky street, TsAGI
Zhukovsky, Moscow Region 140180
Russian Federation
Tel.: +7 495 556 4101
Fax: +7 495 777 6332
E-mail: slc@tsagi.ru
http://www.tsagi.ru