A novel concept of an extremely short take off and landing all-surface (ESTOLAS) hybrid aircraft

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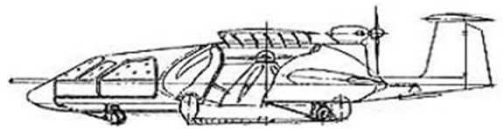
Riga Technical University

11.10.2012

A novel concept for an extremely short take off and landing all-surface (ESTOLAS) hybrid aircraft: from a light passenger aircraft to a very high payload cargo/passenger version. Work programme topics addressed: AAT.2012.6.3-1, AAT.2012.6.3-2

SEVENTH FRAMEWORK PROGRAMME

ESTOLAS Project



FP7- AERONAUTICS and AIR TRANSPORT (AAT)-2012-RTD-L0
(Open call for long term innovation)

ACTIVITY / AREA: Promising pioneering breakthrough technologies and concepts for Aeronautics and air transport.
The topics in this Area are calling for new fundamental knowledge, emerging technologies and radical new concepts with a strong innovation potential in order to achieve a first maturation and/or proof of concept.

Expected impact: Proposals should investigate breakthrough technologies and concepts that have the capacity to cause a step change in aeronautics and air transport in the second half of 21st century.

Type of funding scheme:
Collaborative Project Level 0

Other similar kind project: **Anuloid**, Coordinator – Politecnico of Torino.

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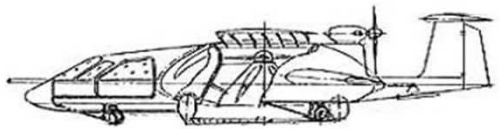
SEVENTH FRAMEWORK PROGRAMME

Introduction



ESTOLAS

The concept has been developed in Tyumen, Russia. In the middle of the ninetieth a reduced guided analogue of the flying device has been constructed and passed preliminary air tests.

The inventor and the main designer, Dr. Alexander Filimonov was able to find essentially new conceptual scheme of the flying device combining the best qualities of an aircraft, a helicopter and a hovercraft.

The idea of hybrid flying device was carried out when the specialists of Tyumen Industrial Institute were considering how to deliver the equipment, large multi-ton blocks to the Jamburg gas condensate field in Northern Siberia.

bella1.wmv

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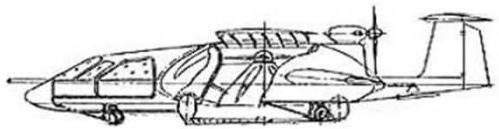
SEVENTH FRAMEWORK PROGRAMME

Planed Tasks and Activities



The needs in the results of the project:

- A small (payload 1-3 tons) ESTOLAS hybrid aircraft is needed for use where light helicopters are currently used but a longer range is required
- A medium (payload 10-60 tons) ESTOLAS hybrid aircraft is needed for use where heavy helicopters are currently used but heavier payload is required to carry to perform relevant tasks
- A large (payload 80-200 tons) ESTOLAS hybrid aircraft is needed for transportation of cargo, including heavy cargo, using small airports or open areas of land or water close to places of origin and destinations of the cargo
- A super-large (payload 200-400+ tons) ESTOLAS hybrid aircraft is needed for special purposes of transportation very heavy cargo using small airports or open areas of land or water close to places of origin and destinations of the cargo.

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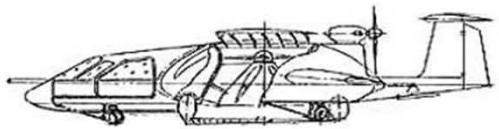

ESTOLAS concept substantiation:

- Transport communication not only among big cities with airfields but also among any towns that have no special runways or small local airfields.
- Technical assistance when developing and operating oil and gas fields, geological exploration, transportation of shift teams, patrolling and servicing of oil and gas pipelines with minimum transportation expenses.
- Solving problems of special subdivisions and services (defense, domestic affairs, emergency situations, health care, communication, border service) in hard-to-reach regions.
- Using for business purposes as an administrative, business or private plane as well as for the development of tourism.

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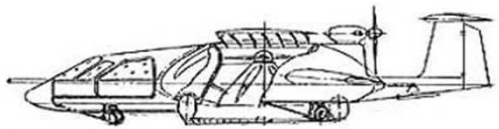
Teams involved



❖ Riga Technical University, Latvia

- ❖ Responsibility: Prof. Urbahs
- ❖ Tasks: Computer simulation, calculation, and formulation of the characteristics of a small version (1 - 3 tons maximal payload), designing, making, and testing of the flying radio-controlled model of the ESTOLAS, wind tunnel testing of physical models

❖ QualityPark AviationCenter GmbH, Germany

- ❖ Responsibility: Mr. Zysk
- ❖ Tasks: Safety assessment, JAR/CS Certification support, Risk analysis

❖ Cranfield University, United Kingdom

- ❖ Responsibility: Prof. Drikakis
- ❖ Tasks: Evaluation of functional landing and taking off characteristics of the ESTOLAS aircraft in comparison with competing hybrid air vehicles

❖ Agentur Kronstadt GmbH, Germany

- ❖ Responsibility: Mr. Papkov
- ❖ Tasks: Estimation of the main engine parameters, the engine efficiency, and the emission level Components estimation, Business plan, Dissemination

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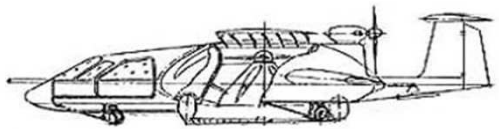

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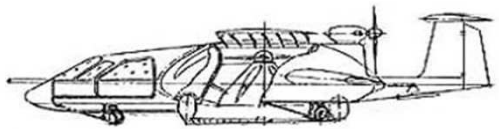
Objectives



Project objectives:

- To calculate and formulate the characteristics of a) small [< 3 tons maximal payload], b) medium [between 10 and 80 tons maximal payload], and c) large [> 80 tons maximal payload] hybrid aircraft, such as flight parameters, the optimal engine type, power and weight parameters, thermal efficiency, specific fuel consumption (SFC), emissions in general and for cargo transportation (kg of fuel per ton of cargo per km), safety, noise level e. t. c. and to denote a perspective propulsion concepts.

- To verify the calculations of the shape and location of the aerodynamic flanges needed to resolve the low stability problem.

- To create demonstration models of the aircraft and test them in the wind tube and in radio-controlled flight in order to verify the calculated characteristics of the ESTOLAS aircraft and validate experimentally the view that the addition of aerodynamic flanges indeed resolved the low stability problem.

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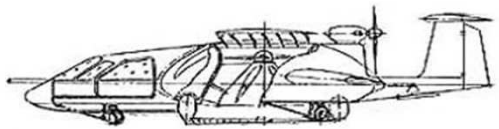

- To study the dimensions of the runways, taxiways and parking spaces in the small and medium European airports and estimate how many of them (in percentages and absolute figures) will be able to accept small and medium hybrid aircraft.

- To compare the ESTOLAS small, medium and large versions with competing air vehicles in terms of the exploitation benefits (i.e. longer range, better fuel economy) *versus the drawbacks,* and to identify the potential market demand by the European and world markets

- To provide safety assessments, risk analysis and JAR/CS Certification support.

- To draw a conclusion about whether the concept of ESTOLAS in its small, medium or large version is feasible for further development.

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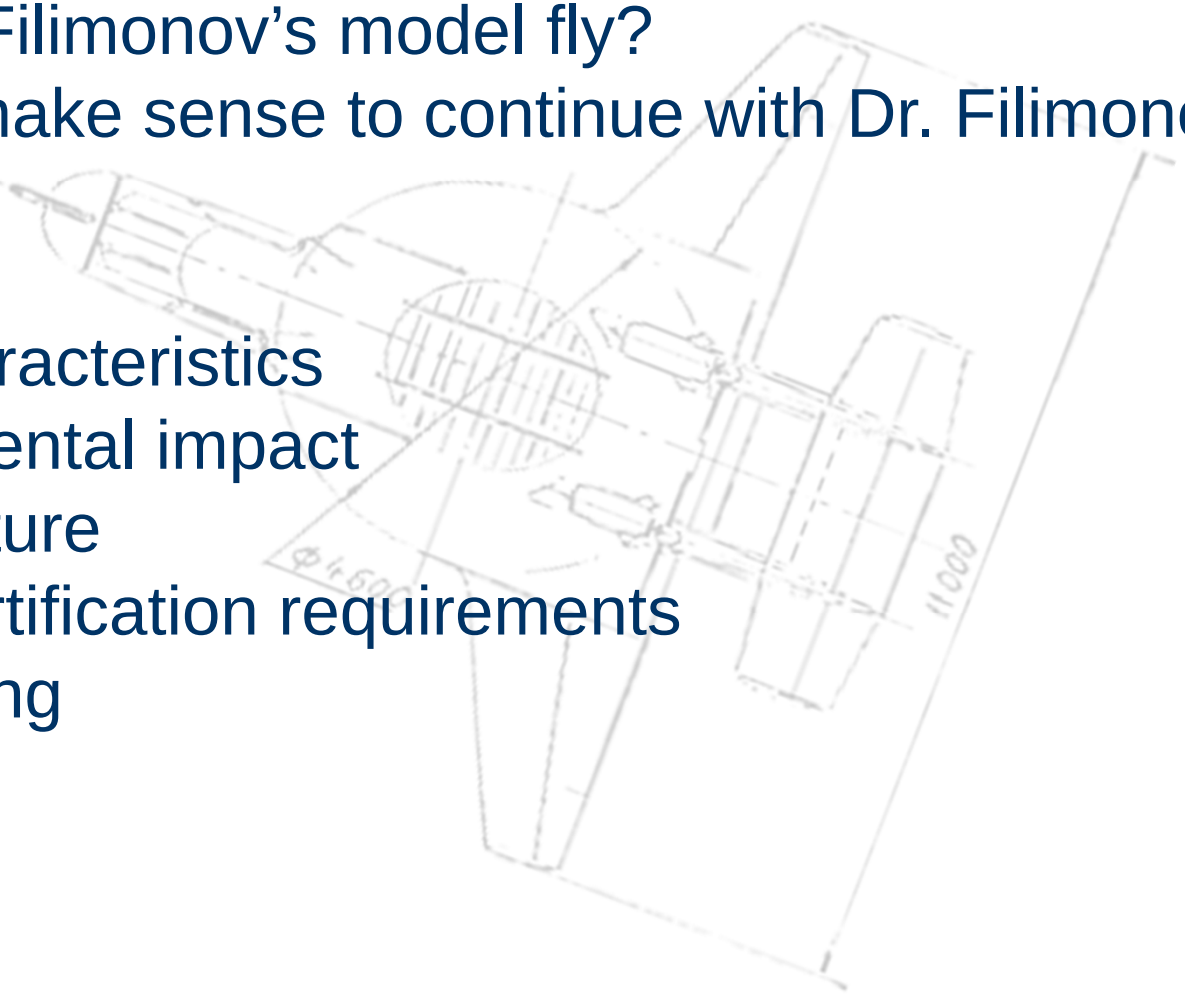
SEVENTH FRAMEWORK PROGRAMME

Objectives

2 main questions:

1. Can Dr. Filimonov's model fly?
2. Does it make sense to continue with Dr. Filimonov's concept?

- Flight characteristics
- Environmental impact
- Infrastructure
- Safety certification requirements
- Engineering
- Engine



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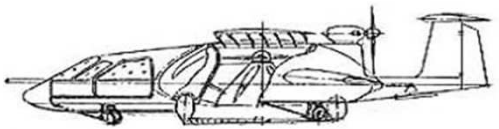

Thank you very much

and

Clear Skies!

www.estolas.eu

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