

Topics in the FP7 next call relevant to small aircraft

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Concepts



● **AAT.2010.6.2-1. Novel air transport vehicles**

Investigation of novel aircraft configurations which could be better adapted to provide the services that future air transportation concepts demand, including combined transport modes vehicles (hybrid vehicles). Consideration should be given to overcoming the weaknesses of current configurations, taking a mission oriented perspective where the vehicle is **to be fully integrated in the total transport system**. Vehicle size and mission could range from **very small door to door personal transport to very large platforms** of transportation, including those suitable for new forms of networking traffic flows, air-to-air and air-to-ground, at subsonic, supersonic or hypersonic (suborbital flight) speeds addressing the environmental concerns regarding energy consumption and noise and setting clearer differentiations between vehicles to transport passengers or goods.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.6.3-3. Personal air transport systems**

- **The aim is the research of concepts and related technologies and operations which will enable future individual air transportation. The idea of personal air transport is not new as it has been regarded as a possible solution to the ever increasing congestion in road traffic, providing at the same time greater speed and flexibility.**

The viability of the concept will depend not only on the design of a vehicle capable to operate under the imposed constraints, but mainly on the operational environment both in the air and on the surface. Challenges for research are the environmental impact, automation of the vehicle and of its operation, certification, maintenance, training of the "pilot", infrastructures, etc.

Relevant underpinning research topics could be found also in other parts of this work programme, in particular in AAT.2010.6.2-1.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **Open in call: FP7-AERONAUTICS and AIR TRANSPORT (AAT)-2010-RTD-1**

AAT.2010.6.3-4. New sources of aircraft main propulsive power

Investigation and system analysis of concepts and technologies for the utilisation of new sustainable primary **sources of energy in the propulsion of the aircraft**. All energy sources, including renewables, could be considered.

A new view of the aircraft propulsive system is to be taken, beyond that of the gas-turbine concept. In addition to the economics of the operation, due regard is to be given to the environmental aspects related to its supply, use and eventual disposal of possible residues. An important subject will be the integration of the propulsive system in the vehicle.

Relevant underpinning research topics could be found also in other parts of this work programme, in particular in AAT.2010.6.1-2.

Note: Work on hydrogen and fuel cells has been excluded from the 2010 calls as the relevant work will be covered by the FCH JTI

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- ***AAT.2010.7-3. Improving passenger choice in air transportation with the incorporation of additional and new vehicles***
- **Expected impact:** Proposals should demonstrate contributing to achieving one or several of the following objectives for readiness by 2020:
 - To increase passenger choice with regard to best air transportation means connecting point A with point B.**
 - To reduce travel charges and time to destination.**
- **Scope:** Study to investigate the technical, operational, economic and regulatory issues relevant to the development of an air transport system which exploits existing vehicles and potential new vehicles (manned and unmanned) in optimum way from the standpoint of seamless capacity of the system as well as providing best choice to passengers, while respecting environmental constraints and safety.
- **Funding scheme:** Coordination and Support Actions aiming at supporting research activities

- ***AAT.2010.7-12. Assessing and further developing the role of small aircraft in the air transport system***
- **Expected impact:** Proposals should demonstrate contributing to an improved understanding of the role that small-size aircraft operating on scheduled or non-scheduled flights can play as a component of the air transport system to satisfy the needs of transportation in regions where transport networks are underdeveloped.
- **Scope:** Study to develop a road map and supporting business case to address the benefits of the use of small aircraft as a component of the air transport systems. The task will identify the technologies necessary to meet the safety, environmental, operational and economic requirements, including integration into the European ATM environment, ensuring complementarity with SESAR. The implications of the safety regulation process as it applies to small aircraft will also be considered.
- **The existing capabilities in the Member States and Associated Countries regarding this sector should be assessed.**
- **Funding scheme:** Coordination and Support Actions aiming at supporting research activities

Technologies

● **AAT.2010.1.1-1. Flight physics**

Advanced concepts and technologies for flow control, airframe aerodynamics design and drag reduction (active or passive); advanced designs for high lift over drag ratios; **innovative high lift devices to enable steeper take-off and landing flight profiles**; advanced concepts and technologies for improved airframe/engine integration aiming at reduced drag and/or reduced noise; development of **adaptive wing and wing morphing technologies**; concepts and technologies to reduce airframe noise in subsonic or supersonic flight.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.4.2-1. Flight physics**

Advanced or novel aircraft configuration concepts that could deliver improved aerodynamic efficiency compared to traditional configurations in subsonic, transonic or supersonic flight; advanced concepts and technologies for flow control, airframe aerodynamics design and drag reduction (active or passive); advanced concepts and technologies for improved airframe/engine integration aiming at reduced drag; **development of wing morphing technologies**; concepts and technologies to reduce drag in subsonic or supersonic flight.

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● **AAT.2010.6.1-1. Lift**

Investigation of new approaches to produce or to control the forces that govern flight, in particular those that **lift the vehicle**. It could consider topics such as other principles of physics as alternative to conventional fluid dynamics, computer controlled **aircraft morphing** into different aerodynamic forms for different flight phases, **thrust vectoring** to provide lift and control.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.1.1-2. Aerostructures**
Advanced concepts and technologies for increased and optimised use of light-weight metallic, composite materials, including metal laminates, in primary structures; **advanced concepts and techniques for application of 'smart' materials**, multi-functional materials, micro and nano-technologies; aero-elasticity, **'smart' structures and morphing airframes**.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.3.3-1. Aerostructures**
Advanced modelling tools, design techniques and structural concepts including its **experimental validation** for improved **protection against crash, impacts and blast loads, including passive and active 'smart' concepts**; advanced methods and techniques to ensure safety of aging airframe and engine structures.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.4.1-2. Aerostructures**
Development of highly integrated structures with **optimum combination of advanced metallic and composite materials** eliminating or minimising the number of join/assembly elements.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.4.2-2. Aerostructures**
Advanced concepts and technologies for increased and optimised use of advanced light-weight metallic, composite materials and metal laminates in primary structures; **advanced concepts for increased integration of additional functions (sensing, actuating, electromagnetic, electrical conductivity, etc.) in structural components for wider applications at low cost and weight**.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.1.1-3. Propulsion**

Advanced concepts and technologies for improving engine thermal efficiency and reducing secondary air losses; advanced concepts and technologies for **improving engine propulsive efficiency**; design tools and techniques for increased application of advanced light-weight high-temperature materials; innovative surface treatment technologies providing improved thermal protection and reducing degradation of aerodynamics performance due to erosion; advanced light-weight engine architectures and components; technologies for optimal use of 'intelligent' and fully digital engine control systems; design tools and techniques for modelling and control of the aerothermodynamics of combustion; technologies for advanced combustor and injector systems; tools and techniques for modelling and measuring engine exhaust gaseous emissions; investigation of the potential opportunities and obstacles and of the required technologies for **greater utilisation of alternative fuels** (e.g. second generation bio-fuels and other 'green' synthetic fuels); **concepts and technologies to reduce power-plant (turbofan, propeller, propfan, rotorcraft rotor) noise by active and/or passive methods.**

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● **AAT.2010.6.1-2. Propulsion**

● Investigation of new approaches to create propulsion power and the energy required for powering vehicle systems. It could consider topics such as the **application of renewable energy sources, including solar power, new-generation biofuels or "green" synthetic fuels, hybrid propulsion as well as other types of energy such as nuclear, plasma jets, beamed energy or ground-based energy forms, propulsion systems for supersonic, hypersonic and suborbital flight.**

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● **AAT.2010.1.1-4. Systems and equipment**

● Advanced concepts and technologies to enable the **all-electric aircraft**, reducing engine bleed and systems weight, including power generation, distribution and management; advanced concepts to reduce weight of mechanical, pneumatic and hydraulic systems; **advanced flight control systems technologies supporting optimised flight procedures for environmentally friendly operation (noise and emissions), including take-off and climbing, cruise and approach, descent and landing** (work should ensure adequate complementarity/synergy with SESAR); new concepts for aircraft anti-icing and de-icing.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.3.3-2. Systems and equipment**

Advanced design techniques and concepts for **improved fire, heat and smoke protection** including novel aircraft evacuation procedures

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● **AAT.2010.4.1-3. Systems and equipment**

Advanced concepts and techniques for higher systems integrations and for simulation of installation environments to enable **rapid customisation and industrialisation with low manufacturing and maintenance costs**; advanced data networks and information management systems, including wireless on-board communications, advanced on-board processing and middleware.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.4.2-4. Systems**

Advanced concepts and technologies to enable the all-electric aircraft, reducing engine bleed and systems weight, including power generation, distribution and management; advanced concepts and technologies for higher integration of on-board mechanical, hydraulic, electrical and pneumatic systems and increased application of light-weight materials in its components, such as **landing gears; advanced concepts and technologies for increased independence of the aircraft from the infrastructure at apron area.**

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.1.1-5. Avionics**

Advanced concepts and technologies for increased **modularity and integration of avionics components and systems**.

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● **AAT.2010.3.3-3. Avionics**

Advanced concepts and technologies to counteract hazards specific to the flight operation of small-size aircraft

● **operating in non-scheduled flights, improving automation, smart responsiveness to unforeseen situations in piloting the vehicle, including those adapted to less-skilled pilot operations.**

● **Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities**

AAT.2010.4.1-4. Avionics

Advanced concepts and techniques to develop robust, affordable, scalable and reconfigurable modular avionics architectures; data networks, packaging and information management systems.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.4.2-5. Avionics**

Advanced concepts and technologies **to reduce crew workload and the number of crew through increased automation**

● **of cockpit functions adapting the role of the crew to new patterns. Where operational issues related to ATM are addressed, complementarity and coordination with the SESAR Programme needs to be demonstrated.**

● **Funding scheme:** Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.6.2-2. Guidance and control**

Investigation of new approaches to **guide and control the vehicle flight with very high or total automation**. It could

● include topics such as the application of new generation computers, on-board or on-ground, to entirely manage the flight and provide for pilot-free operation with the possibility to reverse the operation to human control, robotic technologies embodied in autonomous robots to perform specific guidance and control tasks.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.1.2-1. Production**
Advanced concepts and techniques for the elimination of **toxic chemicals and materials and reduction of waste** in manufacturing processes; techniques and concepts for increased utilisation of environmentally sustainable materials in aeronautical products.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.4.1-1. Design systems and tools**
Advanced modelling and simulation tools to include **'virtual reality' in support of design and 'virtual prototyping'**; development of advanced methods and computational tools in the fields of structural analysis, computational fluid dynamics, aeroelasticity, flutter and dynamic loads, flight dynamics, aerothermodynamics, icing thermodynamics and multidisciplinary optimisation to exploit state-of-the-art computer technologies; knowledge-based design tools and methods to include integrated life-cycle (design, manufacturing, maintenance, re-use or disposal) product definition; concepts and methodologies for efficient multi-site product development in support of the extended enterprise; methods and tools to support reconfigurable customisation of aircraft cabin architectures and interior designs; methods and tools enabling the modular aircraft concept; advanced testing tools and methods to improve cost-efficiency and reduce testing time of laboratory, on-ground and in-flight tests; advanced concepts and procedures in support of novel approaches to certification of aeronautical products and operations.
Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

- **AAT.2010.4.1-5. Production**
Development of advanced **'intelligent' knowledge-based manufacturing and assembly processes and technologies** with increased degree of automation; advanced manufacturing methods to reduce both recurring and non-recurring costs across the whole production cycle from single component manufacturing process to final assembly including techniques to repair and re-use key components and for reduction of waste and consumables; development of techniques for increased flexible tooling; advanced in-process inspection and quality control, including knowledge-based diagnosis and prognosis and damage tolerance.
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AAT.2010.3.1-2. Noise and vibration

- Advanced modelling tools, concepts and technologies (active and passive) to reduce **overall cabin noise as well as noise at passenger level; advanced techniques to reduce vibration and overall effects of noise and vibration on passengers** (harshness) as well as other unwanted dynamics effects of flight (ride comfort).

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- ***AAT.2010.1.3-3. Design systems and tools - Understanding interactions between air transport, environment and society***

The objective is to establish a modelling tool and to carry out an analysis **to identify and assess the impact of air transport on the environment in a systemic approach**. The modelling tool should consider interdependencies between air transport environmental impact, technological evolutions and economical impact. Priority will be given to proposals that take advantage of existing tools and further extend and validate the European modelling capabilities in the view of providing support for the assessment of forecasting scenarios and the impact of European policies.

Projects should have a duration of no longer than 24 months.

Funding scheme: Collaborative Projects small or medium-scale focused research, Coordination and Support Actions aiming at coordinating research activities

● **AAT.2010.3.4-1. Design systems and tools**

Advanced concepts and procedures in support of **novel approaches to certification** of aeronautical products and operations. Where appropriate, the activities should be coordinated with the SESAR Programme and/or EASA.

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AAT.2010.4.3-4. Human factors

- **Advanced concepts and techniques, including training, to support the acquisition and retention of skills and knowledge of personnel across the whole air transport system (design, production, maintenance and airport operation), with particular focus on organisational processes for managing change in an integrated way.** Where issues
- related to ATM are addressed, the proposals under this topic should demonstrate their complementarity and coordination with the SESAR Programme.

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