MAAT

Multibody Advanced Airship for Transport

**Funding:** European (7th RTD Framework Programme)

**Duration:** Sep 2011 - Aug 2014

**Status:** Complete with results

**Total project cost:** €5,071,721

**EU contribution:** €3,767,000

**Call for proposal:** FP7-AAT-2011-RTD-1

**CORDIS RCN:** 99650

**Background & policy context:**

Previous research resulted in promising ideas. They offered the prospect of substantial impact and benefit to the air transport system, they were radical rather than evolutionary, they were forward looking rather than immediate in application and they had specific technology challenges.

The MAAT project investigates the concept of a cruiser-feeder system for medium and long range transports. The cruiser being a very large aircraft, which remain airborne for long periods on stable routes around the world, interconnecting major populated centres. The feeders would transfer passengers and freight to/from the cruiser at interception points in flight.

A number of variants (mode of operation, cruiser and feeder air vehicle design) are possible. There is need to study the system and its components in a structured approach. Note that the environmental impact of the feeder/cruiser system could be considerably better than the present system, as fuel consumption could be substantially less.

**Objectives:**

The MAAT project aims to investigate aerial transportation possibility by airship based cruiser-feeder system. This system is composed of tree modules:

- the cruiser, named PTAH, (acronym of Photovoltaic Transport Aerial High altitude system);
- the feeder, named ATEN (Aerial Transport Elevator Network feeder), this is a VTOL system (Vertical Take Off and Landing) which ensures the connection between the cruiser and the ground;
- the vertical airport hub, named AHA (acronym for Airport Hub for Airship feeders).

The feeder can lift up and down by the control of buoyancy force and displace horizontally to join to cruiser. The project aims to:

- identify and design the best type of propulsion for the PTAH, a discoid innovative airship able to remain airborne for long periods and to travel great distances, in order to reduce the environmental impact against the present system, as fuel consumption is null, both cruiser and feeder are energetically autonomous by photovoltaic energy and innovative electric propulsion;
- study the different ways of approaching and joining between ATEN and PTAH, and consequently, the release of ATEN from PTAH;
- design the best procedure of docking operations thus identified in order to obtain the minimum disruption to passengers and the maximum safety for themselves and for goods.

Furthermore the project aims to study the different architectures of PTAH and ATEN, in such a way that:

- the lift up capacity guaranteed by the buoyancy force, may be accompanied by the power of the engines;
- effective and safe procedures for docking;
- ATEN can land and take off from Airport Hubs named AHA located in major populated centres;
PTAH satisfies the better possible aerodynamic performances possible for the dimensions and the operative mission.

The project also studies the transfer operations of goods and people between ATEN and PTAH to:

- minimize distress conditions for passengers;
- maximize performances especially for goods;
- enhance safety of these operations to maximum possible level.

To achieve the objectives, the study of the system and components must be highly structured.

**Methodology:**

Study the cruiser-feeder system and its components in a fully structured and systemic approach in order to define:

- the general design of cruiser and feeder, to optimize aerodynamics and photovoltaic energy;
- the preliminary structural draft of cruiser, feeder and hub;
- control systems, procedures and codes for stability and flying attitude control;
- electrical propulsion systems able to overcome the problems related to the low air density;
- operative procedures for rendezvous and joining operations;
- internal design of cabins and cargo;
- study and design of cruiser/feeder connections;
- passive and active safety systems.

**Parent Programmes:**

- FP7-TRANSPORT - Transport (Including Aeronautics) - Horizontal activities for implementation of the transport programme (TPT)

**Institute type:** Public institution

**Institute name:** The European Commission

**Funding type:** Public (EU)

**Lead Organisation:**

**Universita Degli Studi Di Modena E Reggio Emilia**

**Address:**
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**Organisation Website:**
http://www.unimore.it

**EU Contribution:** €825,039

**Partner Organisations:**

**University Of Lincoln**

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Brayford Pool
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**EU Contribution:** €357,750

**Engys Ltd**

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The Green 1
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<td><strong>EU Contribution:</strong> €272,751</td>
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**The University Of Hertfordshire Higher Education Corporation**

**Address:**
College Lane  
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AL10 9AB  
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**EU Contribution:** €277,000

**Vrije Universiteit Brussel**

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**EU Contribution:** €387,000

**Southern Federal University**

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**EU Contribution:** €315,500

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**EU Contribution:** €183,960

**Politecnico Di Torino**

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**Organisation Website:** [http://www.polito.it](http://www.polito.it)
### EU Contribution:

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<td>Alma Mater Studiorum - Universita Di Bologna</td>
<td>Via Zamboni 33 40126 Bologna Italy</td>
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<tr>
<td>Universidade Da Beira Interior</td>
<td>Convento De Santo Antonio 6201 001 Covilha Portugal</td>
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### Organisation Website:

- [http://www.unibo.it](http://www.unibo.it)

### Technologies:

- Aircraft design and manufacturing
- Multibody airship

### Development phase:

- Research/Invention

### Key Results:

#### Return of the airship

A new concept for aviation combines a permanently flying airship with a lander shuttlecraft. Its realisation would greatly simplify and liberate airport design, and take transport to a new level.

Economists predict global air transport is set to grow dramatically, even though aviation is actually quite constrained, especially by airport capacity. An EU project proposes a radical alternative that will not be restricted by the conventional limits of airports and their associated regulations.

The ‘Multibody advanced airship for transport’ ([http://www.eumaat.info](http://www.eumaat.info) (MAAT)) project aims to bring back and modernise airships. The 12-member consortium includes 10 European partners and one each from Russia and Uruguay, and will run from September 2011 to February 2015. With EUR 3.7 million in EU funding, the project set out to develop a radical new kind of airship. The concept combines an airship that remains permanently aloft, with a vertical take-off feeder/shuttle system for ground access. The third component is a new airport concept, the vertical hub, which could be easily built outside major urban areas or at logistical centres.

Based on these goals, the project set five technical objectives. They include developing a solar-powered feeder system, finding a propulsion system suitable for high-altitude flight, and optimising the complete system architecture. MAAT's proposed system would have zero emissions, offer a large payload capacity and make fair speed in calm conditions. The system could set down passengers or freight directly in downtown areas, saving considerable ground transport time compared with normal aviation.

During the first 18 months, the project first proposed and compared various design options, and settled
on a final general system design. Doing so solved numerous difficulties, including safety and photovoltaic power system issues, and weight minimisation. Solutions, based on the constructal method, have been tested with encouraging results. Other areas of design and simulation covered flight mechanics, energy and propulsion systems, controls and telecommunications, cruiser/feeder docking and joints, and cabins, cargos and transfer. Certain difficulties have yet to be resolved but will be addressed in system testing and demonstration.

The project's dissemination work includes press releases, web news, press cuttings, blogs, brochures and videos. Project members have also published several journal articles, and presented papers at conferences and workshops.

MAAT's outcome will be a revolution in passenger and freight transport via a zero-emissions and highly convenient flight system.

**STRIA Roadmaps:** Vehicle design and manufacturing  
**Transport mode:** Air transport  
**Transport sectors:** Passenger transport, Freight transport  
**Transport policies:** Decarbonisation, Deployment planning/Financing/Market roll-out  
**Geo-spatial type:** Other