Project n° : **516165**

ADELINE

Advanced air-**D**ata **E**quipment for air**LINE**rs

Specific Targeted Research Projects (STREP)

Priority 4 : Aeronautics and Space

Deliverable D14 : 6-months activity & management report n°2

Due date of deliverable: **January 15th, 2006**

Actual submission date: **February 10th, 2006**

Start date of project: **January 15th, 2005** Duration: **36 months**

THALES AVIONICS

Revision (**00**)

Project co-funded by the European Commission within the Sixth Framework Program (2002-2006)		
Dissemination Level		
PU	Public	X (executive summary only)
OO	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

THALES

Advanced air-**D**ata **E**quipment for air**LINE**rs	6-months activity & management report n°2	
	Ref : ADELINE.5.D.PR.THAV.014(draft)	

SIGNATURES

Written by	*Responsibility - Company*	*Date*	*Signature*
All partners			
Verified by			
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CHANGE RECORDS

ISSUE	*DATE*	*CHANGE RECORD*	*AUTHOR*

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1	ADELINE Web site	

THALES AVIONICS INTERNAL SIGNATURES

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EXECUTIVE PUBLISHABLE SUMMARY :

The objective of ADELINE is to develop new architectures and technologies of air data systems for implementation in new aircraft on the horizon of 2010.

Actual air data equipment is composed of a large number of individual probes and pressure sensors. This equipment delivers vital parameters for the safety of the aircraft's flight such as air speed, angle of attack and altitude. The loss of these data can cause aircraft crashes especially in case of probe icing.

The main project targets are: to reduce present equipment costs by 50 % including purchasing and exploitation costs, to increase aircraft's safety by drastically reducing air data system failure.

These targets will be achieved by developing simpler, more reliable and safer equipment than the American systems that dominate the market.

The scientific objectives of ADELINE are: Identification of innovative air data system architectures, development of innovative measuring concepts to acquire all information with only two different types of probes instead of three for competitors' solutions, development of breakthrough technologies.

MAJOR ACHIEVEMENTS DURING THE REPORTING PERIOD

The first year of the ADELINE program has been very productive. The objective of this first twelve month period was to kick-off the program, to identify and analyze existing aircraft air data system architectures, to propose and compare innovative architectures, to establish the technological state of the art of all technical area involved in probes development, to specify requirements for innovative probes development, to propose new measurements principles for aerodynamic probes, to select new materials and coatings or the structure of the probes, to identify new de-icing and anti-icing techniques for probes, to identify news packaging solutions for the integration of the MEMS pressure sensor in the probe and to select the most promising technical bricks to develop in the next WP (T0+10 to T0+15). These goals have been achieved.

The demanded deliverables have also been produced by the consortium : existing architecture synthesis (D1), architectures critical analysis report (D2), technological state of the art analysis (D3), Innovative architectures comparison report (D4), specification of new equipments (D5), 6-months activity & management report n°1 (D7), new measurement principles research report (D8), candidate materials selection report (D9), candidate coatings selection report (D10), de-icing and anti-icing techniques research report (D11), sensor packaging theoretical study report (D12), critical analysis and selection of technical bricks report (D13), 12-months activity & management report (D14), preliminary plan for using and disseminating knowledge (D15).

These deliverables are available on ADELINE web site http://www.adeline-aero.org/. The ADELINE secured web site constitute the deliverable D6 of the project. It has been enriched by a "Users club" option in November 2005 in order to give access to relevant deliverables to the users club members.

The communication within the project is very good and the partners' participation to meetings has been fully adequate with the need.

The kick-off meeting was held in Toulouse (France) the 25th of February 2005.

A first technical progress meeting was held in Sheffield (United Kingdom) the 7th of April 2005 to kick-off WP2000 and to plan activities between April and June 2005. In addition, Cti facilities were presented to the consortium to better understand how Cti could contribute to the ADELINE project (capabilities to produce moulds to cast aluminum, steel, titanium, magnesium etc …)

A second technical progress meeting was held in Vendôme (France) the 23rd of June 2005 for THALES to present results on architectures analysis to the consortium for RWTH to presents the technological state of the art for all ADELINE research area. Trials on materials and coating have been decided during this meeting. THALES, ATCT and TUB have presented some idea to commence the research on pressure sensor packaging, new probe concepts and de-icing techniques. The Adeline-web site has been presented by TUB. THALES INT facilities were presented to the consortium to better understand what is the challenge to produce thousand kinds of probes for the helicopter and aircraft industries.

A meeting with AIRBUS, an ADELINE user club member, has been held in Toulouse (France) the 3rd of May. We have presented the first ADELINE conclusions on aircraft air data system architectures to AIRBUS and we have got constructive remarks from it. AIRBUS has contributed a lot to D1 production.

A third technical progress meeting held in Berlin (Deutschland) the 14th and 15th September 2005. During this meeting, THALES (INT) has presented several new probe measurement concepts to the consortium : the fluidic total pressure probe, three new concepts to measure the analog of attack using ultrasound, strain gages, and convection, and proposal to use new MEMS sensing elements to measure temperature in total air temperature probes. ATCT has presented a mock-up for a convective AOA probe using PTC and a preliminary study on possibilities to integrate PTC to prevent icing of fluidic total pressure probe. TUB has presented a new concept of probe packaging using a liquid "cork" to protect the pressure sensor from mechanical stress, humidity and surface layer contamination. In addition, TUB has provided a list of MEMS thermal sensors for THALES INT. Following, the publication of D3, THALES has selected four materials of interest for the new probes. Samples of those materials have been cast to Cti and supplied to RWTH for coating test and to THALES for assembly test. In addition, Cti has made some trials to cast heating wires in tube shape materials and has already identified issues to be solved in WP3000. RWTH has presented the possible materials candidate to coat the above mentioned materials and has presented some results in term of coating process parameters (cleaning, deposition) and resulting mechanical properties (hardness, elastic modulus, coating adhesion (calo-test, crash-test), residual stress, abrasion. In addition, RWTH has estimated the cost of PVD coating. THALES Valence has presented some possibilities to detect pressure sensor drift. The study starts

by an identification of drift causes, then a function is defined to assess drift in sensor operation. At the end of the meeting, we have discussed a list of technological bricks to develop within September 2005 and February 2006 in the frame of WP3000. Three additional side meetings took place after the Berlins's meeting :

- THALES AVIONICS (Vendôme) met Cti in November 2005 to discuss : the development of fluidic pressure probe resin mocks-up for wind tunnel testing in January 2006 (bricks development), the casting and delivery to RWTH and THALES of tubes (in those tubes, THALES will braze heating wires and RWTH will achieve temperature test of the materials), the casting and delivery of THALES of cast-in heaters.

- THALES AVIONICS (Vendôme) met VZLU in December 206 to check the performance of the VZLU wind tunnel facility using a standard Pitot tube whose performances are perfectly known. The measured performance was excellent and test could be done up to Mach 2.

- THALES AVIONICS partners (Valence & Vendôme) met beginning of January 2006 to assess the progresses of the project, to prepare the annual review and set up an action plan for the next 3 months activity.

The next consortium meeting will be the annual review. During this formal review the project results will be presented to the EC and the user club (AIRBUS, DASSAULT , EUROCAE).