PROJECT

CASAM

Civil Aircraft Security Against MANPADs

Funding: European (6th RTD Framework Programme)
Duration: Jun 2006 - Jun 2009
Status: Complete with results
Total project cost: €8,651,122
EU contribution: €4,543,401

Call for proposal: FP6-2005-AERO-1
CORDIS RCN : 79952

Background & policy context:
MANPAD guided missile attacks against commercial aircraft have been rare, but the growing proliferation of shoulder-fired missiles makes them an ideal terrorist weapon. Downing even a single airliner with a MANPAD could have a devastating impact on the airline industry, and potentially drive more carriers out of business.

To date some 15,000 shoulder-launched infrared guided missiles (MANPADs) are in circulation globally, in uncontrolled hands (over 27 terrorist groups are known to possess them). Their relatively low cost and the vulnerability of large aircraft taking off or landing makes for a high security risk. The United States are responding to this by preparing regulations requiring commercial aircraft to be equipped with onboard protection systems.

It is vital for Europe, from a security and an economic standpoint, to be able to answer this requirement, and solutions have therefore been pursued which are now coming to fruition with several initiatives, among them CASAM.

Objectives:
The global objective of the CASAM project (Civil Aircraft Security Against MANPADS project) was to design, and validate a closed-loop laser-based DIRCM (Directed IR-Counter Measure) module for MANPADS jamming, which would comply with the constraints of commercial air transportation, including the civil aircraft profile of flight, and would be able to defeat MANPADS of first and second generation (currently the most available worldwide) and also of third generation which might be available in the future. For example, the following aspects were considered:

- Environmental friendliness for ground objects and inhabitants close to airports, aircraft safety (maintenance, handling and usage) and high efficiency against the recognised threats;
- Upgradability for further and future disseminated threats;
- Adherence to commercial operation budgets and processes.

The detailed CASAM objectives included:

- Taking into account relevant regulation and standardisation issues, to define, with the end-users the consolidated operational requirements for commercial airliners (e.g. the total ownership cost per hour of flight) and the resulting specific technical requirements / specification for the DIRCM;
- To define the detailed architecture of critical subsystems (turret, opto-mechanical unit, laser and related software) of a closed-loop DIRCM-system able to detect a threatening MANPAD threat, to identify the type of IR-seeker, to track the missile and to jam the MANPAD-seeker within few seconds;
- To design and demonstrate an innovative and simplified turret;
- To design and demonstrate an innovative IR laser source: wavelength 1.8-5μm, with at least 2 band independently tuneable, high repetition rate, with controllable wave form in order to be used for both identification and defeating modes;
To design and demonstrate a DIRCM software (including controlling the turret, seeker identification, tracking, laser beam controlling, defeat signal) and an interface connecting an off-the-shelf Missile Warning System (MWS) and the DIRCM;

With national confidentiality/classification constraints, to validate on ground the DIRCM technology being developed. A simulation SW-model of MWS will be coupled to the laboratory prototype of the DIRCM and used to defeat a real missile-seeker;

To determine the expected level of protection achievable by such a system, in particular in the high threat environment in close vicinity.

**Methodology:**

Broadly speaking, the project's methodology involved the study of the following fields:

1. Threat analysis and simulation;
2. Economic analysis and aircraft installation constraints;
3. Impact;
4. Legal and regulation issues; and
5. Prototype development and testing against missile seeker heads.

The project also tackled specific technical problems:

1. At the level of the aircraft and its environment:
   - A complete study of the global requirements of airlines and airframers: low total volume, low drag, low mass, low power consumption, high reliability, low LCC (life-cycle cost), and no risk on ground and during take-off and landing.

2. At the level of the main technical DIRCM modules:
   - Optronics having low volume, low mass and low cost: steering and stabilisation studies for the opto-mechanical turret, design of the focal plane array (imagery sensor) integrating passive and active detection modes for improved passive and active tracking modes, device design for line of sight stabilisation.
   - Laser technology based on new progress in OPO crystals with a simplified architecture: research was undertaken on mass, volume and consumption reduction for the pump laser, OPO research dealt with wavelength conversion stage optimisation, crystal choice, arrangement and optimisation.
   - Laser technology based on new efficient approaches including fibre lasers and simpler frequency conversion modules (OPO), as well as directly emitting mid-infrared semiconductor lasers.
   - Tracking technology was adapted and optimised in synergy with hardware development.

During the three-year project, CASAM explored several technological breakthroughs in laser, optics, electro mechanics and processing that would be the core of the future competitive equipment. Specific effort was put on threat analysis and simulation, economical analysis, aircraft installation constraints and impact.

A specific study was carried out on legal and regulation issues which had a prominent position in the roadmap.

Major European actors (large enterprises and Research organisations) and highly specialised SMEs cooperated inside a Consortium, bringing all skills and resources necessary to make CASAM a success and reinforce the European position in this domain.

**Parent Programmes:**

**FP6-AEROSPACE - Aeronautics and Space - Priority Thematic Area 4 (PTA4)**

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Lead Organisation:**

Sagem Défense Sécurité

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**Partner Organisations:**

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**As Laser Diagnostic Instruments**

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Key Results:

All CASAM objectives were achieved during the project as detailed in the Publishable Final Activity Report.

The main conclusions of the Project could be summarised as follows:

1. Certification & Regulation: no major obstacle to obtain STC but it is desirable to have legislation giving certainty in respect of the safety standards to be applied (both for certification and liability regime purposes).
   - EASA should be engaged in consultation to determine the standards in the near future and for the purposes of international consultation.
   - To avoid inconsistencies between e.g the US and EU standards, there should be international engagement to harmonize standards: ICAO is a possible forum for such engagement, if not bilateral.

- Transfer of Technology controls: uniform measures need to be addressed across the military and dual use technologies export control regimes of EU member States:
  - Need of engagement on State to State level.
  - Need of appropriate EU organ to engage with USA.

Documents:
- Publishable Final Activity Report (Final report)

STRIA Roadmaps:  Vehicle design and manufacturing
Transport mode:  Air transport
Transport sectors:  Passenger transport, Freight transport
Transport policies:  Safety/Security
Geo-spatial type:  Infrastructure Node