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nEUROn

AN EFFICIENT EUROPEAN COOPERATION SCHEME

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I – INTRODUCTION

For the coming twenty years, the European combat aircraft industry will face three main challenges:

- **the need to develop strategic technologies,**

- **the necessity to uphold skills of excellences** in areas in which the European industry has gained technical competences and fields of excellence,

- **the goal to provide workload to the European design offices.**

Facing such a situation, the French government took the initiative by launching in 2003 a project for a technological demonstrator of an Unmanned Combat Air Vehicle (UCAV), elaborated in the frame of a European cooperation scheme.

The aim of the nEUROn demonstrator is to provide the European design offices with a project allowing them to develop know-how and to maintain their technological capabilities in the coming years.

This project has gone far beyond the theoretical studies that had been conducted until then, with the assembly and the successful flight demonstration of an unmanned combat aircraft.

It is also a way to implement an innovative process in terms of management and organisation of a European cooperative programme.

To be fully effective, a single point of decision, the French Defence Procurement Agency (DGA – *Délégation Générale pour l'Armement*), and a single point of implementation, Dassault Aviation company as prime contractor, were settled to manage the nEUROn programme.

The Italian, Swedish, Spanish, Greek and Swiss governments acting together with their related industrial teams, Alenia, SAAB, EADS-CASA, Hellenic Aerospace Industry (HAI) and RUAG, have joined the French initiative.

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II - AIM OF THE PROGRAMME

The aim of the nEUROn programme is to demonstrate the maturity and the effectiveness of technical solutions, but not to perform military missions.

The main technological challenges addressed during the development phase of the nEUROn were:

- the shapes of the air vehicle (aerodynamic, innovative composite structure, and internal weapon bay),
- the technologies related to low observability issues,
- the insertion of this type of aircraft within the test area,
- the high-level algorithms necessary to the development of the automated processes,
- as well as the place of the human factor within the mission loop.

The last, but certainly not the least, important technology which will be demonstrated is the capability to carry and deliver weapons from an internal bay. Today, European aircraft are designed with external loading capabilities for bombs and missiles.

The following goals were achieved during in-flight trials:

- **demonstrating an air-to-ground mission**, with the detection, localization and reconnaissance of ground targets in autonomous modes,

- **assessing the detectability** of a stealth platform facing ground or aerial threats, in terms of radar cross section and infrared signature.

It is clear that through these demonstration missions, the goals are to validate technologies around command and control of an unmanned air vehicle of a size similar to a combat aircraft, with all back-up modes insuring necessary safety and security.

The nEUROn system is network-centric capable.

III - PROGRAMME ORGANISATION

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The programme of the nEUROn technological demonstrator is organised as follows:

- a single executive agency, the French DGA which awarded a main contract to the prime contractor and manages the project,

- a single prime contractor, Dassault Aviation company, which is in charge of the main contract implementation.

Ever since the beginning of the programme, the French authorities have clearly stated their will that the UCAV technological demonstrator project should contribute to the build-up of a European defence identity by fully opening it to cooperation. As such, about half of the tasks are entrusted to non-French industrial partners.

In terms of management, this organisation guarantees the best efficiency in a full partnership approach and cooperative relations between the various actors, as well as an improved budgetary control.

IV - AN EFFICIENT EUROPEAN COOPERATION SCHEME

In accordance with the guidelines defined by the French DGA, Dassault Aviation has entrusted about 50% of the work value to European partners, elected after a scrutinized evaluation based on:

- **Experience and excellence:**
The objective of this project is not to create new technological capabilities everywhere in Europe, but to take the full benefit of the already existing technological niches.

- **Competitiveness:**
This project has the ambition to find new ways for costs reduction. Each partner, in addition to their technical excellences, is invited to apply for the most efficient *"value for money".*

- **State budget allocation:**
It is a condition imposed by the French DGA that each country having the ambition to participate to the nEUROn programme shall contribute to its financing. For more flexibility, no constraint in term of *"geographical return"* is assigned to this project, as already dealt with at governmental level.

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V - RELATED INDUSTRIAL TEAM

The industrial team of the nEUROn programme is composed of:

- **Dassault Aviation** (France), in addition to being the design authority, takes care of the general design and architecture of the system, the flight control system, the implementation of low observable devices, the final assembly, the systems integration on the “global integration tests rig”, the ground tests, and the flight tests,

- **Alenia Aermacchi** (Italy) contributes to the project with a new concept of internal weapon bay (“Smart Integrated Weapon Bay” - SIWB), an internal EO/IR sensor, the bay doors and their operating mechanisms, the electrical power and distribution system, and the air data system,

- **SAAB** (Sweden), is entrusted with the general design of the main fuselage, the landing gear doors, the avionics and the fuel system,

- **EADS-CASA** (Spain) brings its experience for the wings, the ground station, and the data link integration,

- **Hellenic Aerospace Industry - HAI** (Greece) is responsible for the rear fuselage, the exhaust pipe, and the supply of racks of the “global integration tests rig”,

- **RUAG** (Switzerland) is taking care of the low speed wind tunnel tests, and the weapon interfaces between the aircraft and the armaments.

VI - INNOVATIVE INDUSTRIAL SOLUTIONS

The nEUROn is the first large size stealth platform designed in Europe.

Building on the experience gained from recent projects, for the first time in a military project, the nEUROn is designed and developed within the frame of a completely integrated *“Product Lifecycle Management”* (PLM) environment, through a “virtual plateau”, allowing Dassault Aviation and its partners, located in the different countries, to simultaneously work together on the same design data base, independently from the location where the design activities are currently performed.

All the teams involved from the very beginning of the programme know them each other very well, thanks to the development tasks jointly performed in the design office implemented inside the Dassault Aviation facilities of St-Cloud, as well as with the daily use of distant collaborative tools provided with the “virtual plateau”.

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The very same teams worked together on the aircraft, or on the “global integration tests rig”.

This specific and innovative organisation allowed a perfect tempo to be achieved in order to rapidly solve any technical events occurring during the development phase of the programme.

VII - PROGRAMME MILESTONES

The nEUROn programme was launched in 2003.

The main contract was notified to the prime contractor **in 2006,** the industrial partnership contracts were signed concurrently.

The first flight of the technological demonstrator was completed on December 1, 2012, in Istres (France).

VIII - DEMONSTRATIONS FLIGHTS

The following scenarios were validated through the demonstration flights:

- **insertion in the test range airspace,**
- **air-to-ground subsonic mission,**
- **detection, localisation and autonomous reconnaissance of ground targets** without being detected *(“to see without being seen”).*

The trial campaign will conclude with:

- **an air-to-surface weapon release from an internal bay.**

IX - PROGRAMME STATUS

By mid-2015, low-observability and electro-optical performance had both been demonstrated in Istres and in Sardinia. The next campaign, in Sweden, is currently being prepared.

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X – CONCLUSION

The nEUROn programme is a major opportunity for the European industry to:

- **develop its capabilities in the UAV field,**
- **to keep and maintain its competences in order to be ready for the design of the next generation of European combat aircraft,**
- **to experience a new programme management process, optimized through an innovative international cooperation scheme.**

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