nEUROn
AN EFFICIENT EUROPEAN COOPERATION SCHEME

I – INTRODUCTION

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

- t**he 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 goes far beyond the theoretical studies that have been conducted until now, as it plans the building and the flight demonstration of an unmanned 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.

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 design phase of the nEUROn are:

- 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 that has been 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, laser designation and optical RECCE .

The demonstration goals are the followings:

- **the performance of an air-to-ground mission** based on the detection, localization, and reconnaissance of ground targets in autonomous modes,

- **the evaluation of the detection results of a stealth platform** facing ground or aerial threats, in terms of radar cross section and infrared signature,

- **the weapon release from an internal bay**, with the very stringent tempo constraints of a fast decision loop.

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

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

- single executive agency, the French DGA which awarded a main contract to the prime contractor and manages the project,
- 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 was not to create new technological capabilities everywhere in Europe, but
to take the full benefit of the already existing technological niches.

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

- State budget allocation:
It was 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" was assigned to this project, as already dealt with at governmental level.

V - RELATED INDUSTRIAL TEAM

The industrial team of the nEUROn programme is composed of:

- **Dassault Aviation** (France), in addition to being the design authority, has taken 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** (now Leonardo, Italy) has contributed 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), was entrusted with the general design of the main fuselage, the landing gear doors, the avionics and the fuel system,

- **EADS-CASA** (now Airbus Defence & Space, Spain) brought its experience for the wings, the ground station, and the data link integration,

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

- **RUAG** (Switzerland) was 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”.
Today, the same teams still work together close to the aircraft, or on the “global integration tests rig”.
This specific and innovative organisation allows to achieve a perfect tempo 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).

The 100th sortie was recorded on the Feb 26, 2015.

The release of a weapon from the internal bay was carried out on September 2, 2015.

VIII - DEMONSTRATIONS FLIGHTS

The scenarios to be validated through the demonstration flights will be as follows:

- 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"),
- air-to-surface weapon release from an internal bay.

IX - PROGRAMME STATUS

As of mid-2016, the nEUROn program status is as follows:

a) Following initial flights (December 2012), the nEUROn was transferred to the research center of the French defense procurement agency DGA in Bruz, near Rennes, to evaluate **stealth** performance. The campaign, which took place in an anechoic chamber, lasted until May 2013. Results were described as excellent.

b) The nEUROn was displayed at the **Paris Air Show** in June 2013, where it attracted a lot of interest.

c) In summer 2013, the nEUROn returned to Istres for the French test campaign. **In the initial phase**, the purpose of the tests was to open up the aircraft's flight envelope (including with weapon bay doors open), to test the electro-optical sensor and to evaluate datalink performance.

In the second phase, most of the flights were dedicated to signature/detection tests in the infrared and electromagnetic ranges using operational systems.

d) The nEUROn was subsequently transferred to **Italy** (spring 2015), then **Sweden** (summer 2015) to be exposed to operational systems deployed by these two major program

partners. A test launch of a 250kg bomb was successfully carried out on 2nd September 2015 in Sweden.

During all these test campaigns, the nEUROn was operated by Dassault Aviation teams. The availability and reliability of the aircraft and associated equipment were outstanding.

All the expected results were achieved. Data and lessons learned relating to stealth will constitute a reference for future aircraft projects.

This success demonstrates the competences of Dassault Aviation in strategic technologies and in prime contractorship, as well as its capacity to lead European cooperative programs.

e) From 2016 to 2018, the DGA has organized three annual national flight test campaign of the nEUROn in Istres to study the use of an unmanned combat air vehicle in a naval context and to realize new confrontations with operational and experimental systems. Tests at sea with the Charles de Gaulle aircraft carrier have been realized in July 2016 and January 2019.
The campaigns of 2017 and 2018 have been the occasion to test the nEUROn facing Spanish partner's operational systems.

f) End 2016 and early 2017, a new campaign of electromagnetic signature measurements at the DGA's Bruz center in order to test the **furtivity** performances after more 130 flights. Results have been qualified as excellent.

g) In Autumn 2019, the DGA will launch a new flight test campaign.

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.**

ANNEX

Main characteristics of the nEUROn:

- **Wingspan ≈ 12.5 m**
- **2 weapon bays**
- **Empty weight ≈ 5,000 kg**
- **Max. weight ≈ 7,000 kg**
- **Engine: RRTM Adour**
- **Autonomy ≈ 3 hours**

Contacts :
Stéphane Fort - Stéphane Fort, Corporate Communication VP
☎ : + 33 (0)1 47 11 86 90
Nathalie Bakhos - Export Military Communication
☎ : + 33 (0)1 47 11 92 75

Courriel : presse@dassault-aviation.fr
Internet : www.dassault-aviation.com
Twitter : @Dassault_OnAir