

Ronchi dei Legionari 2010

Unmanned Aerial System Capability

SELEX Galileo, a Finmeccanica Company, provides advanced Unmanned Aerial Systems (UAS) to customers worldwide. Delivering comprehensive solutions including platforms, sensors, mission systems and integrated ground stations for data transfer, SELEX Galileo can provide dramatically enhanced situational awareness to its customers..

SELEX Galileo's portfolio includes mini/micro and tactical and medium altitude / endurance UAS, all of which come fully equipped with sensors and networked capability, delivering a high degree of situational awareness and contributing to force protection within modern ISTAR solutions.

Leveraging on world class mission systems and sensor integration expertise, SELEX Galileo is working to position itself as one of the main players in the fast evolving and growing market of OUAS/MALE, offering state of the art bespoke avionics and mission systems to national and international platform primes.

FALCO

The Falco UAS, designed and manufactured by SELEX Galileo at the Ronchi dei Legionari site in Italy, is a tactical UAS designed to supply command and control net-centers with a tactical overview of the operational scenario and target cueing in real time. Falco has captured a fair amount of international attention and has been selected by two customers in the Middle East / Central East Asia markets.

Latest Developments

The FALCO System was validated after very successful trials lasting 15 months which were carried out in three different continents (Africa, Europe, Asia), under the most diverse climatic and operational conditions.

In particular, during the flight tests made by the end user, the Falco carried out a surveillance mission with its maximum payload which lasted 9 hours and 15 minutes. This performance shows that, by using an auxiliary fuel tank, the maximum range for the system would exceed the 14 hours previously anticipated.

All the main functional requirements for surveillance missions have been fully demonstrated. The results obtained include:

- Collection and control of data on a 200 km redundant link between the GCS and the Falco air vehicle, through a jam-resistant transmission in real time.
- An operational ceiling of a maximum of 6000 meters
- Autonomous navigation control system and automatic use, during flight, of different payloads

- Automatic Take Off and Landing (ATOL) operability
- Night-time mission operability

Mission Ready

Falco is a field proven, tactical, medium altitude, endurance Unmanned Aerial System designed for civil and military surveillance. A suite of payloads including AESA radar, electro optic turrets, ESM, and 24/7 all-weather capability equip Falco to perform a wide range of missions.

Falco features ramp take-off, fully automatic short take-off and landing capabilities and day/night flight and navigation, plus a NATO compliant Ground Control Station enabling mission planning, re-tasking and data fusion. Falco's reliability, maturity, flexibility and most importantly its extended capability, allows the vehicle to perform roles at the top end of the tactical UAS category.

Falco features a fault-tolerant architecture which meets European Aviation Safety Agency (EASA) airworthiness guidelines for both civil and military oriented products.

Transportable on C-130 type aircraft, easily deployable and with a tested full-payload catapult launch capability, the Falco represents the ideal solution for ISR activities in a tactical environment. Pre-flight, flight and landing activities can be performed by a flight team of no more than five people.

System recovery is accomplished by automatic conventional wheeled landing, tactical short landing, or by parachute. Landing gear is designed to prevent payload and aircraft structure damage due to heavy landings (decks landings or parachute recovery) and for semi-prepared landing strip operations.

Key Benefits

- Double payload capability (e.g. EO/IR + SAR GMTI) up to 70 Kg
- Endurance up to 14 hours with basic surveillance payload for long lasting missions
- Automatic Take Off and Landing (ATOL), night operations included
- Fully automated way-point based missions can be flown from take-off to landing, including beyond radio-link coverage.
- Hand-over take-over operations, from fixed or mobile ground stations.
- Minimal refueling and lower maintenance and flying costs compared to rotary or fixed wing manned aircraft.

A Proven Product

- 2001 start of system development
- 2003 Maiden flight of the technology demonstrator
- 2004-2006 extensive test campaigns at four separate sites (Sardinia, Bulgaria, UK, and Desert Location in High Temperature/High Humidity). Thousands of simulated flights at RIG, with the real hardware in the loop, achieving high reliability results

- 2005 (June) Falco becomes the first UAS in Europe, to obtain a Civil Permit to fly thanks to its development under EASA draft rules for UAS, performed under control of the Italian National Authorities for Civilian Aviation (ENAC)
- 2006 In production
- 2008 (December) at the Cheshnegirovo air base in Bulgaria the Falco performed its first launch from a pneumatic catapult during an extensive flight campaign. The catapult launch allows the Falco to be operated tactically from locations where no airstrip is available, satisfying the complete range of operational requirements.
- 2008 onward: the system is fully operational as an ISTAR platform with international customers
- 2009-2010 Intense flight demonstration programme to international customers in challenging environmental conditions ranging from scorching deserts to freezing snow. The system has successfully performed all missions and met all customers' specific requirements in terms of endurance, reliability, data collection and payload management.

Military certification – Timeline

- 2005 Falco System Military Certification Work Group to define requirements
- 2006 Law provisions concerning Italian Armed Forces UAS
- 2008 Issued System Requirement Specifications compliant with Italian Armed Forces Military Certification Rules.

Civil certification - Timeline

- 2005 ENAC issued the first European “Permit to Fly” clearance and the first UAS civil identification code to the basic Falco UAS System
- 2006 UK CAA endorsed ENAC “Permit to Fly” authorising flights at ParcAberporth

Safety functionality

- Redundant architecture for safety critical functions.
- Primary and Backup FMS (Flight Management System) and inertial navigation systems with real time GPS.
- Dual power supply.
- Double Command and Control Console (CCC)

Falco Ground Control Station

The Falco Ground Control Station (GCS) enables mission planning and retasking, mission simulation for operator training, mission rehearsal and play back. From the GCS the operator can control payloads and sensors and handle the collected data in real time or pre-program their tasks during the mission planning phase, enhancing UAS autonomous operational features.

The aircraft can be flown in manual and in fully automatic mode, including automatic take off and landing operations. The GCS is capable of off-line target data evaluation and processing, for further diffusion through the C4I net.

The ground data terminal provides a higher-than-200km redundant link range between the GCS and the Falco air vehicle, through a jam-resistant option data transmission in real time.

Technical specifications

Air vehicle length:	5,25 m
Wing span:	7,20 m
Height:	1,80 m
MTOW:	490 Kg
Performances (ISA conditions)	
Endurance:	8-14 hours
Max payload weight:	70Kg
Ceiling:	6000 m
Max airspeed:	60 m/s
Link range:	200 Km (extendable with relay capability or GCS handover)

Payloads

EO/IR
Laser designator
SAR GMTI
Surveillance radar
ESM
NBC sensors
Chaff/Flares dispenser

UAS BATTLELAB

SELEX Galileo's BattleLab is a cost effective system for:

- UAS Training
- Operational Analysis of UAS missions
- System requirements definition / Simulation Based Acquisition (SBA)
- Analysis and demonstration of innovative solutions/technologies

The BattleLab can easily be adapted to support a variety of platforms and payloads.

The BattleLab can be linked directly to a Ground Control System (GCS) or to a simulated UAS GCS. The system supports a wide range of tasks including the simulation and validation of:

- Route plans
- Terrain avoidance/obstacle avoidance
- Sensor Scan coverage verification
- Radio link verification
- LOS verification
- Sensor/multi sensor comparison (Platform Optimisation)
- UAS pilot and co-pilot Briefing/debriefing

The main elements of the BattleLab are:

- UAS simulator (Simulation of UAS dynamics and sub-systems)
- UAS ground control station (A real UAS ground control station can be connected, an alternative, simulated UAS ground control station is available)
- Sensor simulator: EO, IR, Radar (RBGM & SAR) (Sensor simulation includes also the simulation of the sensor logic and tracking functionalities)

- Synthetic Environment (SE) for environment and CGFs simulation
- Geographic database and libraries: geographic data, maps and the libraries of CGFs
- 2D Scenario Tactical Display (TDF)
- 3D visualization of the tactical scenario (Stealth View)
- Interface to other simulation networks

THE MIRACH 100/5 INTEGRATED AERIAL TARGET SYSTEM

The Mirach 100/5 is the standard high-performance, reusable, multi-threat target, in use with worldwide Armed Forces to train and qualify major weapon systems. Mirach 100/5 delivers reliability and manoeuvrability, making it the most complete multi-role target drone system on the market.

In Use Worldwide

Certified by the Italian Joint Forces in 1998 and continuously upgraded since, the Mirach 100/5 System has been in use by the Armed Forces of the UK, Italy, France and Spain, as well as operated for the benefit of the Armed Forces of U.S.A., Germany, Greece, India and other NATO and International customers.

In December 2006 the Mirach 100/5 was selected as the High Performance Target (HPT) for the UK's Combined Aerial Target Services (CATS) programme, covering 20 years of threat simulation for weapon systems training and the T&E requirements of the UK Defence Forces. The CATS contract has been established as an all-encompassing major private finance initiative to provide aerial threat emulation services across the entire training and missile development spectrum. The QinetiQ Ltd CATS Program was awarded the "Best UK Deal to Sign" in the "Public/Private Finance Awards 2007".

A Complete Solution

Mirach 100/5 is controlled by a Ground Control Station (GCS) that allows mission planning and re-tasking, mission rehearsal and play-back and operator training. A flexible selection of mission payloads, installed inside the fuselage and under the wings, effectively complies with the requirements of most complex missile system engagement scenarios for training and weapon systems test and evaluation.

The Mirach 100/5 target drone is launched from a zero-length ramp using two JATO boosters, thus offering a full day/night - adverse weather capability, from fixed ground (e.g. ranges) and from mobile facilities (e.g. ships); it can be recovered by parachute on ground or at sea, with a turn around time of less than one hour for ground recovery and 3 hours for sea recovery.

These characteristics enable the system to be used by air defence units as an organic training capability, simulating multiple threats and war-like scenarios in tactical conditions. A fully automatic pre-flight test prevents system failures in order to increase overall mission reliability. Furthermore, an operator is not required to manually perform the check, thus optimizing personnel involvement and safety.

The Mirach 100/5, with a naturally low radar and IR cross section, has the ability to mimic flight profiles of attacking aircraft and anti-ship missiles through its high payload capability and ample variety of configurations. The simulation includes most present-day threats and their

performances, including very-low-altitude sea skimming missions, tight formation flights and 3D manoeuvres up to instantaneous 8g sustained load factors, covering a flight envelop between 3 and 12.500 metres above sea level. The top-performing Mirach 100/5 System combines operational flexibility (e.g. rapid adaptation to mission planning changes) with a NATO certified Mission Reliability of more than 98%.

SELEX Galileo has also developed a specific payload for the Mirach 100/5, consisting of an expendable air launched, jet-propelled, autonomous sub-target, named Locusta, that allows a direct hit on an independent fast flying threat, without establishing a “friend or foe” procedure, thus improving the realism of the tactical scenario in the most cost-efficient way. The Locusta Drone can be provided as a stand-alone product, and can be fired from an aircraft or helicopter.

Key Points

- State of the art high subsonic aerial target system;
- Routinely used by major European Armed Forces;
- NATO certified mission reliability >98%;
- Lowest overall life cycle costs;
- Simulates most present-day threats in terms of kinematics and signatures, including: Sea Skimming ASM, Fighters and strike aircrafts, Cruise missiles, Fast UAS;
- Ground or sea recovery with respectively 1 or 3 hours turn around time;
- Customized, turn-key configurations.

Technical specifications

Length:	4,07 m
Wingspan:	2,30 m
Height:	0,89 m
Fuselage diameter:	0,40 m
MTOW:	360 Kg

Performances (ISA conditions)

Endurance:	90'
Max speed:	Mach 0,85
Min altitude:	3 m
Max altitude:	12.500 m
Load factor:	Instantaneous: 8g
	sustained: 6g
Max payload:	70 Kg

Payloads

Active and passive RCS augmenters

IR augmenters

IR and chaff dispenser (IRCM/A and IRCM/M)

2 Towed body systems (IR, active/passive RF Tow targets)

2 Air launched autonomous expendable sub-targets (Locusta)

Missile seeker head simulators (eg. AN DPT-1)

Miss distance indicator

Vector scoring system

Smoke generator system

NIBBIO

NIBBIO, a fast drone system, is a development of the successful Mirach 100/5 aerial target drone family. NIBBIO is part of a programme which has transformed the Mirach 100/5 aerial target drone from a training role to a tactical one ("fast drone").

NIBBIO occupies an important position in the Company's range of UAS, ensuring that users can perform the entire spectrum of surveillance missions without risking pilots' lives.

The NIBBIO transformation programme defines the tactical aircraft's operating capabilities by studying the possible scenarios in relation to the tasks assigned to the armed forces. From the basis of the prerequisites required for a "fast drone", particular characteristics have been singled out, developed and implemented on the Mirach 100/5 fast drone. Some features, such as the preprogrammed altimetry control of the aircraft, the ability to reprogram missions in flight, and acquisition of images in real time were checked during the flight activity started in May 2005.

During the flight campaign, tests were also successfully conducted to prove a digital link for sending information in Line of Sight (LOS) conditions as well as a satellite link for command and control of the aircraft in Beyond Line of Sight (BLOS) conditions.

Selex Galileo has also successfully proposed the Mirach 100/5 tactical variant to DGA/DCE for the development of a reconnaissance technology demonstrator for the French MoD (Carapas Program).

The next steps in the NIBBIO programme will be to select the final prerequisites needed by the Mirach 100/5 aircraft for the complete transformation of the system to a "fast drone".

Press Office Contacts

Solange Distefano Pozzuoli
Responsible for Press Office

Tel: +39 06 41883710
Mob. +39 335 7499374
email: solange.distefanopozzuoli@selexgalileo.com

John Stevenson

Press Office Coordinator
Tel: +44 (0) 1268 883013
Mob. +44 (0) 7540 628691
email: john.stevenson@selexgalileo.com