

ICAO's RPAS/3 Symposium

RPAS Operations – beyond the paradigm of manned aviation

Chengdu, 11 September 2018



Leonardo: a key player on RPAS

Proprietary
Partnership

SKY-Y

MALE class , Technology demonstrator platform (eg MIDCAS)

FALCO – FALCO EVO

Tactical UAS Family, carrying wide selection of proprietary multispectral sensors for persistent ISTAR

MINI UAS

Mini UAS, delivering situational awareness and network interoperable

nEUROn

European programme for a new stealth unmanned combat air vehicle (UCAV)

EUROPEAN MALE CLASS RPAS

European program for a new –gen MALE class to support long endurance ISTAR missions.

PIAGGIO P1HH

GCS, mission system and sensors provider



Leonardo Helicopters R - RPAS



MTOW 205kg

AWHERO

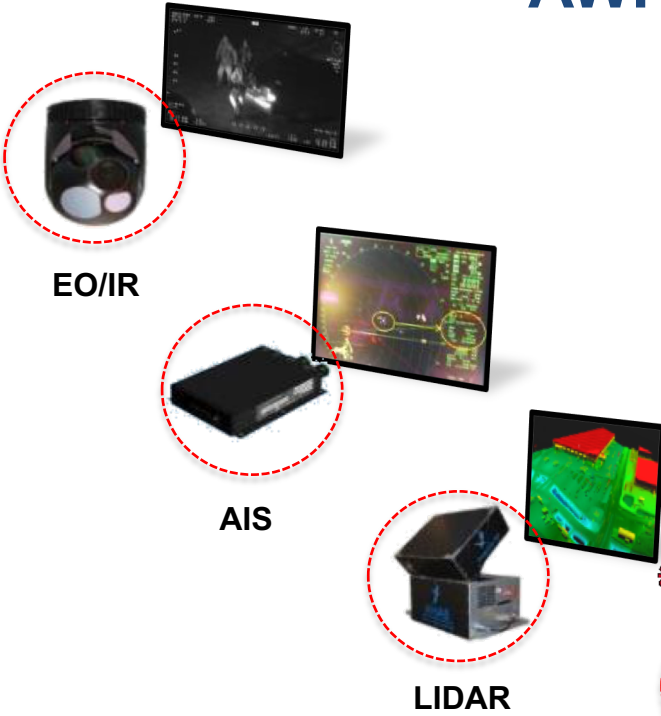
Unmanned

Optionally Piloted **SW-4 Solo**



MTOW 1800kg

AWHERO – Mission Payloads



Endurance Performance:
6 hours @ 35Kg



AWHERO - Missions Capabilities

Missions:

- *Fire risk assessment mapping.*
- *Surveillance to provide fire early-warning.*
- *Day & Night mapping of fire evolution.*
- *Real-time data for firefighters and first responders.*
- *Assessment of natural disaster.*
- *Pollution damage assessment.*
- *Critical infrastructure assessments.*
- *Real-time data for first responders.*
- *Pipeline Monitoring.*
- *Search and Rescue (Land & Maritime).*

Payloads:

- *Gyro-stabilised camera systems with infrared thermal imaging sensors and colour TV sensors.*
- *Mobile phone localizer (SAR Missions).*
- *AIS and Maritime Radar (SAR Maritime Missions).*



SW-4 Solo RPAS/OPH – Scope of the Program

To develop a medium size Unmanned/Optionally Piloted Helicopter (RPAS/OPH) for:

- *Demonstration of Remote Piloting technology capability.*
- *Demonstration of Operational Mission capability in simulated and real environment (land and maritime).*
- *Industrialization of demonstrator/prototype and launch to market.*

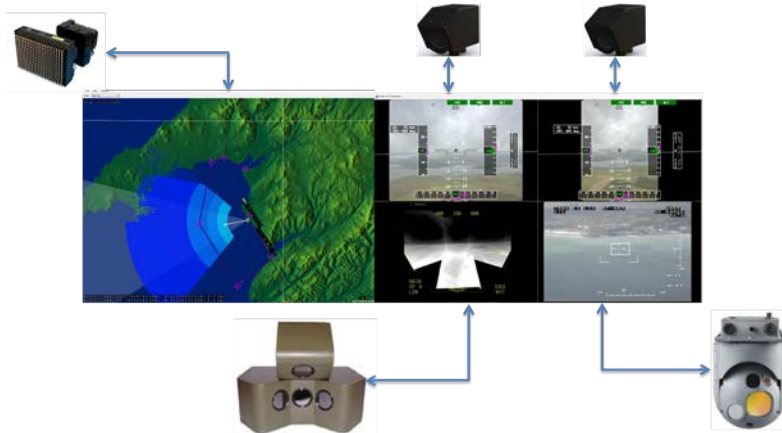


SW-4 Solo in flight without «Safety Pilot» on board

SW-4 Solo RPAS/OPH – Mission Payloads

An example of specific payloads for maritime missions surveillance:

- 14" EO/IR.
- Maritime RADAR.
- ESM (Electronic Support Measure).
- AIS (Automatic Identification System).



Distributed Multi Sensor C2 capability



SW-4 Solo RPAS/OPH – Experimental Activities

The **first "Application"** to have a **Permit to Flight (PtF)** was presented to **EASA** and **ULC** (the Polish Aeronautical Authority) in order to fly in configuration RPAS, but with **"Safety Pilot on board"**.

While the first "Application" to have a Permit to Flight to carry out RPAS flights **"Without Safety Pilot on board"** was presented to **ENAC** with the request to receive a PtF for the SW-4 Solo RPAS, as Annex II Experimental Aircraft, in accordance with Italian NAV 32 Circular.

RPAS System Safety Objectives were consistent with the guidelines provided by **Jarus Working Group 6 – Safety & Risk Assessment for a RPAS-27**, with a complexity level II.
(ref. to JARUS AMC RPAS.1309. Issue 2, November 2015).

A **technical report** assessing the **risk of the flight test activity in Grottaglie Test Range** has been produced and discussed with ENAC.

It was prepared in accordance with the **ENAC Guidance Document n. 2017001-NAV Ed. 1 of 16/01/2017**, "Metodologia di Valutazione del Rischio in Operazioni RPAS per Autorizzazioni e Permessi di Volo non Geografici. Guida Applicativa".

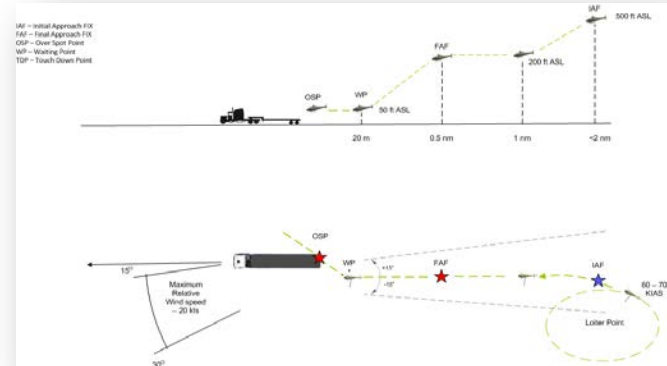
Up today, the SW-4 Solo RPAS/OPH has performed more than **200 flight hours** in automatic flight with remote control.



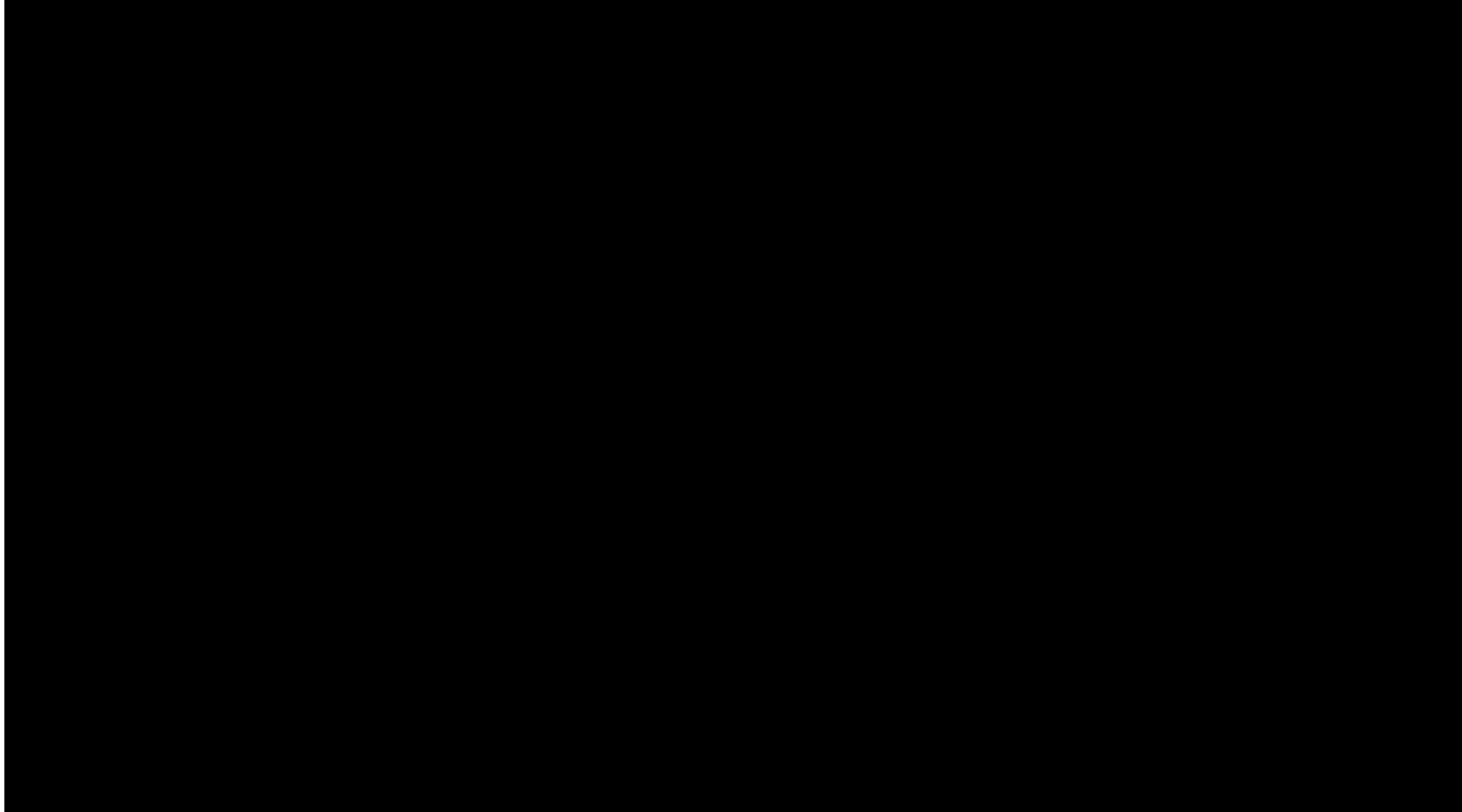
SW-4 Solo RPAS/OPH – Demonstration Activities

Precision auto-land and auto-takeoff with a moving platform - Simulating Ship Operations

Generation of a position, velocity and full attitude vector between the H/C and a moving spot point.



SW-4 Solo RPAS/OPH – Demonstration Activities



Leonardo Helicopters RPAS/OPH Demonstration Activities and Programs

Unmanned Warrior (achieved)

Where: Scotland
When: 10 – 20 October 2016
Sponsor: UK MoD
Platform: SW-4 'SOLO'
Objective: ISTAR capability demonstration and command & control integration in real operational environment.

CCD Demo PH1 (achieved)

Where : Galles - UK
When: 2013-2015
Sponsor: UK MoD
Platform: SW-4 Solo
Objective: ISTAR Mission Capability and shipboard operation in simulated environment.

CCD Demo PH2 (in progress)

Where : UK
When: 2016 - 2018
Sponsor: UK MoD
Platform: SW-4 Solo and AWHERO
Objective: shipboard operations demonstration in real environment.

Italian Blade (achieved)

Where: Viterbo - Italy
When: 22 June– 3 July 2015
Sponsor: European Defence Agency
Platform: SW-4 Solo
Objective: ISTAR Mission Capability and «manned/unmanned» teaming in real operational environment (LOI 2 demonstrated).

Full Unmanned Flight (achieved)

Where: Grottaglie - Italy
When: 2017
Sponsor: PV
Platform: SW-4 Solo
Objective: Flight without SP on board.

Surveillance Demonstration (achieved)

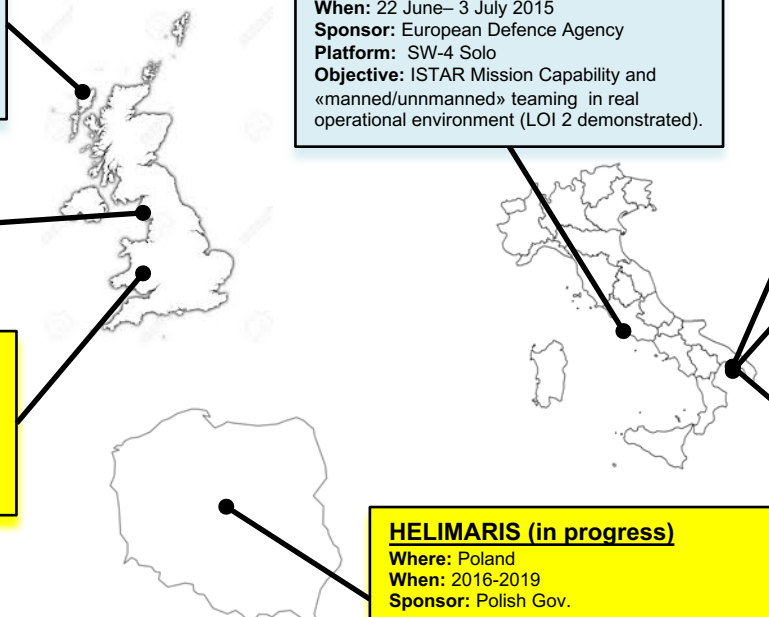
Where: Grottaglie - Italy
When: 2017
Sponsor: PV
Platform: SW-4 Solo
Objective: Flight with SP on board.

SESAR INsuRE (achieved)

Where: Grottaglie - Italy
When: December 2015
Platform: HERO
Objective: flight demonstration in non segregated air space
Participants : UAS, ENAV & ENAC.

HELMARIS (in progress)

Where: Poland
When: 2016-2019
Sponsor: Polish Gov.
Platform: SW-4 'SOLO'
Objective: Innovative use of OPH platforms in maritime operations.



SW-4 Solo RPAS/OPH – Full Unmanned Flights

14th & 16th December 2017 in the Test Range RPAS, approved from ENAC, located near the "Marcello Arlotta" Airport close to Grottaglie (Ta) the SW-4 Solo has performed two Flight Tests in RPAS mode without a Safety Pilot on board.

Duration of the both Full Unmanned Flights was in total of 1 hour.

Details of the two flights:

- **14.12.2017 – Lift-off and touchdown:**
Purpose of this task was to execute an auto lift-off to the achievement of a stable hover and then auto-touchdown.
Duration of the flight around 15 mins.

- **16.12.2017 - RPAS Demo mission:**
Purpose of this task was the completion of an entire unmanned mission, starting from engine startup until its shutdown.

The mission steps performed by SW4-Solo were:

- Take off from main airport runway,
- Climb to 1500 ft and to fly according to planned route with 60kts of airspeed,
- Perform a loiter around a specific area,
- Return to main airport runway and landing.

Duration of the flight around 45 mins.



SW-4 Solo RPAS/OPH – Full Unmanned Flights



The Consortium

- As **industry leader**, **Leonardo** was awarded the most important project related to the first round of European Defence Funded Initiatives under the **Preparatory Action** on Defense Research program
- Ocean 2020 is a **pan-European inclusive team of 42 partners**, among which **major defense players** such as Saab, Safran, Indra, PGZ, MBDA, **several SMEs** and **major Research Institutes** such as TNO and Fraunhofer, with also the contribution from the NATO CMRE CoE
- The Consortium will be **supported by several European Navies** which will take active part in the trials

Project Objective:

- Enhanced situational awareness** in a maritime environment through the deployment and **integration of various domains' UxS**
- Meet the challenges to enhance surveillance persistency over a wider area Surveillance and **multisource real-time data integration**

Trials:

- Demo 1 – Mediterranean Sea Q3 2019**
Scenario 1: Fast Boat Interdiction
Scenario 2: Cargo Vessel Interdiction
- Demo 2 – Baltic Sea Q3 2020**
Scenario 1: Unmanned surface threats
Scenario 2: Unseen submerged threats



THANK YOU FOR YOUR ATTENTION

