



AeroFIS[®] Flybot

Small Uncrewed Aircraft System for NAVAID Inspection & Calibration

The AeroFIS[®] Flybot is a versatile, efficient and small, uncrewed aircraft system (UAS) complementing conventional flight and ground inspection tasks and procedures.

The modularity of the system allows for the easy installation of specialized sensor payloads dedicated to the inspection of various radio and visual aviation navigation aids (NAVAID) like ILS, VOR, and VGSI. The AeroFIS[®] Flybot is an efficient and convenient supplement to the flight and ground inspector's toolbox.



AeroFIS® Flybot

Key Features:

- Reliable, easy to operate drone, with integrated obstacle detection and collision avoidance functions
- Automatic execution of flight inspection procedures
- Online visualization of flight inspection data on ground
- Drone setup through well-proven AeroFIS® software user interface:
 - Same facility database used by drone and flight inspection aircraft
 - Identical profile definition
 - Same algorithms
 - Same graphic look and feel display
 - Situation awareness displays (PFD, Moving Map)
 - Common, compatible data recording for comparison with crewed flight inspection
- RTK-based position reference with centimeter accuracy
- Lightweight drone with an MTOM of 9 kg
- Modular system using specialized sensor payloads for various calibration tasks.



Application Scenarios



The purpose of the AeroFIS® Flybot is twofold. It allows for a more convenient execution of NAVAID ground inspection tasks while also providing easier access to challenging measurement locations.

Furthermore, the AeroFIS® Flybot is a complement to conventional, crewed flight inspection and allows for an efficient pre-calibration of NAVAIDs in advance of a commissioning flight inspection. Correlation between drone measurements and flight inspection measurements can be easily demonstrated in order to increase the intervals between crewed periodic flight inspections.

System Overview

The complete AeroFIS® Flybot system consists of the remote control, the FIS operator laptop computer, the DGNSS/RTK ground station, the drone platform, and the task specific FIS payload. This modular payload is composed of two elements:

- The FI Core module provides general functionality for the recording, processing and transmission of flight inspection measurements from the FI Sensor module.
- The FI Sensor modules are easily interchangeable and provide the sensor specific to the measurement task. It can consist of navigation receivers and antennas for radio NAVAIDs or optical sensors for the inspection of VGSI installations or infrastructure.

The FI payload and FIS operator computer are highly integrated with the professional UAS platform DJI Matrice 300. The multi-constellation GNSS RTK-aided position, velocity, and attitude solution allows for a FIS position reference with cm accuracy. The AeroFIS® software running on the FIS operator laptop provides the prepared flight procedures and tuning of the receiver to the drone pilot's remote control. The remote control runs the specialized AeroFIS® Flybot Remote Control software for the control and supervision of the inspection and calibration tasks.

The flexible AeroFIS® Flybot equipment enables a convenient and timely operation.



AeroFIS® Flybot

Concept of Operation

Two persons – a remote pilot and a FIS operator, usually operate the AeroFIS® Flybot. The remote pilot communicates with ATC, and controls and monitors the drone in flight. The FIS operator utilizes the AeroFIS® software of the FIS operator laptop for the set-up of the drone flight profiles and the recording, supervision, and interpretation of the measurements.



The flight inspection measurements and parameters are visualized in near real-time at the FIS operator laptop. The user interface of the AeroFIS® Flybot software and of crewed AeroFIS® equipped aircraft are identical. Both platforms share the well-established AeroFIS® flight inspection functionality and algorithms.

The planned flight inspection procedures are directly transmitted into the drone pilot's AeroFIS® Flybot Remote Control software. It provides a map view of the drone position and the flight procedure, and a first person camera view of the drone to the pilot.

The procedures are executed for automatic flight by the pilot's press of a button while the FIS operator controls the flight inspection functions.



The AeroFIS® Flybot software shares a comprehensive commonality with AeroFIS® for crewed Flight Inspection.