

DVI²AM[®] Drone for VOR and ILS/Infrastructure Advanced Maintenance

The all-in-one UAS solution for Nav aids ground-check and more.

» Mission:

Inspection is a crucial factor for the evaluation of facilities performances as required by ICAO. Traditional procedures rely on ground check using special and expensive vehicles or instruments, together with periodical flight checks.

Based on these premises, Techno Sky, as part of ENAV Group, has developed its own UAS solutions for near-ground flight inspections of NAVAIDS and airport infrastructures.



Operational Scenario:

The DVI²AM[®] product is a high-performance drone that can be equipped with instruments required for the specific task, such as compact VHF/UHF receiver/analyzer, spectrum analyzer, high-resolution camera or infrared camera and dedicated payload for FOD detection, assessment of runway/taxiway pavement status and bird control.

Key Benefits:

- Better cost effectiveness compared to traditional ground check vehicles and equipment
- High flexibility of operations achieved by handling customized payloads
- High precision GNSS+RTK positioning
- Drone solution for ILS ground check approved by Italian CAA as an alternative for Ground Check Vehicle
- Performing BVLOS operations (if approved by local regulator) enabling cost reduction also via implementation of centralized control centers

Regulations and certifications:

- Reg. EU 2019/947
- ICAO Annex 10 Vol I
- ICAO Doc 8071 Vol I
- FTS compliant to EASA MoC Light-UAS.2511
- Class Mark C3 (Reg. EU 945/2019)
- Reg. EU 139/2014
- Parachute compliant to EASA MoC 2512

Main capabilities:

Our drone solution can inspect and/or perform measurements on the following types of facilities:

- ILS (GP and LOC)
- Marker
- VOR
- DME
- PAPI
- Communication channels (VHF/UHF)
- GBAS
- Runway and taxiway pavement integrity status
- Elevated infrastructures status (e.g. RADAR RADOME)
- Airport lightning visual aid
- FOD detection (Foreign Object Debris)
- Airport perimeter surveillance

Main measurement profiles for NAVAIDS (ILS and VOR):

- **ILS Localizer Course Alignment:** dynamic analysis of Localizer, carried out across the runway axis at constant speed and altitude, allows to analyze the magnitude of interest such as Difference in Depth of Modulation (DDM), Sum of Modulation Depths (SDM), Measurement of electric field strength (RF) and 90/150 Hz Modulations (MOD 90/150)
- **ILS Localizer Displacement Sensitivity:** dynamic analysis performed crossing the runway heading towards the Localizer and passing over the threshold. This process measures the ratio of Difference in Depth of Modulation (DDM) to lateral displacement, ensuring precise alignment and sensitivity within the specified sector limits
- **ILS Localizer Off-Course Clearance:** dynamic evaluation of signal integrity and coverage beyond the course sector, performing an arc of $\pm 35^\circ$ at a radius of 150 meters from the Localizer center. This process ensures that the Localizer provides accurate guidance and maintains signal clarity even when the aircraft is off-course

- **ILS Glide Path:** static and dynamic analysis of GP, carried out raising the drone to a predetermined altitude on a fixed point (e.g. runway threshold), allows analyzing DDM and its temporal stability at several altitudes of the runway perpendicular
- **VOR stability:** static analysis of VOR antenna carried out acquiring data in specific positions on the reference radial or other default, allows analyzing the temporal stability of the magnitudes of interest.

Payloads:

Leveraging on high flexibility, Techno Sky UAS can be equipped with different payloads such as:

- electro-optical camera
- infrared camera
- multispectral camera
- VHF/UHF analyzer
- LIDAR
- Speaker

Ground Control Station:

Techno Sky UAS is equipped with a customized HMI that allows:

- planning of flight missions
- command & control
- real time data display

The HMI is battery powered and can be easily carried to site and mounted on a standard tripod. It includes all devices that allow a reliable and stable datalink with the drone during flight. It can be also equipped with an external RTK base station to ensure high-precision GNSS positioning.