Approach lights and navaids inspection and calibration with drones. AENA

Drone aplications and future developments
at airports managed by AENA.

Dirección: Proyectos y Construcción
División: Ingeniería

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1.1 AENA LABORATORY ELECTRICAL ENGINEERING AND AGL TEAM AND FUNCTION

TEAM

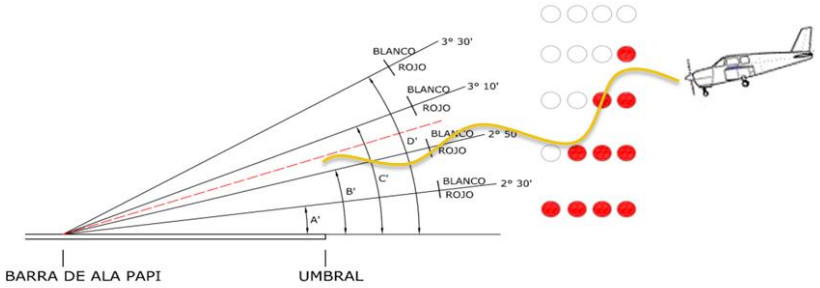
- 4 Technicians and 1 engineer

ASSIGNED TASKS IN AENA AIRPORTS NETWORK

- PAPI Ground Assistance during Calibration Flight.
- APRON Lighting meassurement and consulting
- AGL Photometric measurement (outsourcing support)
- Power lines check and diagnosis
- CCR check, diagnosis and consulting
- Central purchasing AGL products
- Support and consulting to AENA airports network

2.1. DRONE PROCEDURE. ALT. METHODS

FLIGHT CALIBRATION METHOD



THEODOLITE METHOD

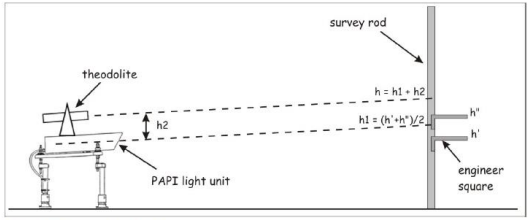
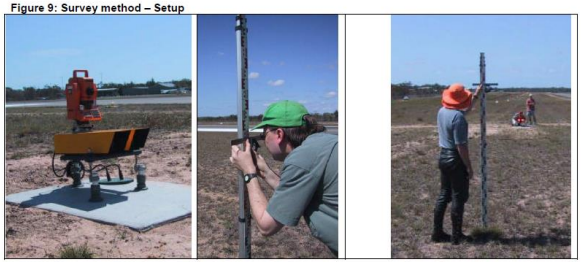


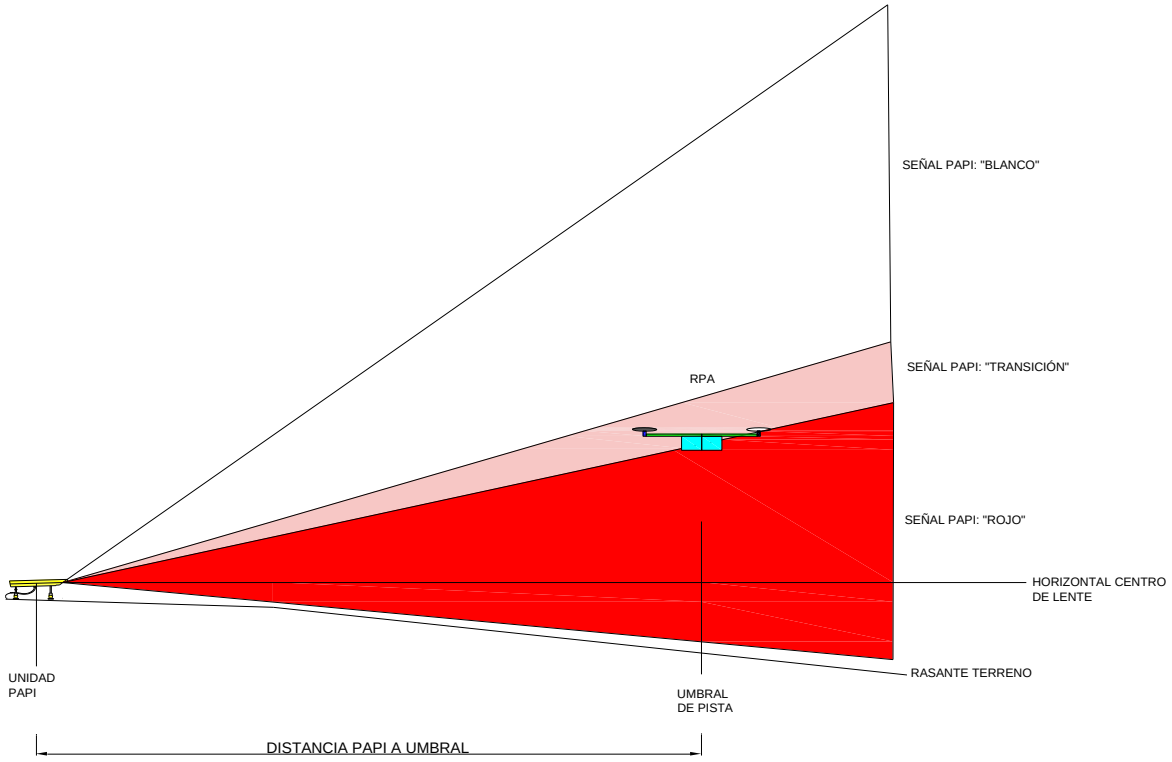
Figure 9: Survey method – Setup



CHERRYPICKER METHOD

AUTOMATIC CLINOMETER (SMF-PAPI)

2.1. DRONE PROCEDURE



2.2 DRONE PAPI CALIBRATION: ADVANTAGES vs. DISADVANTAGES

ADVANTAGES:

- Less cost
- Less RWY occupancy time
- Safer operation
- Night operation
- Better accuracy

DISADVANTAGES:

- Less flight time
- Less flight ceiling and range
- Azimuth PAPI range test
- Long PAPI range test

2.3. Drone Operator CANARDDRONES

Main equipment:

DJI – MATRICE 600 PRO
Visible spectrum camera

2.4. PAPI Calibration at Cordoba Airport

2.5. Calibration at El Hierro Airport

2.6. PAPI Calibration at Murcia Airport

2.7. Safe operation and regulation

- **Drone technology designed for ATC space:**
  - Receiver ADS-B signal from manned traffics

- **Spanish regulations for drone operations in airports:**
  - Previous authorization from national safety agency (AESA)
  - No authorization by this moment in ATC space
  - Test has been done in closed airports

- **Canard operations in other EU countries:**
  - Paris CDG (ADP Group). Procedure validated by DGAC
  - Pori, Finland. PAPI certified.
  - Poland. First test.

2.8. Authorization proccess in spain

- **Cualified DRONE Operator: Spanish Safety Aereal Agency (AESA) approval**
- **Safety assessment**
- **AESA previous approval for this operation scenario (to the DRONE operator)**
- **Operator Request to Airport**
- **Previous coordination with Air Traffic Control**
- **Operational Safety Plan approval (Airport)**
- **Working authorization (Airport)**

3. ALS inspection

3.1 Proposal

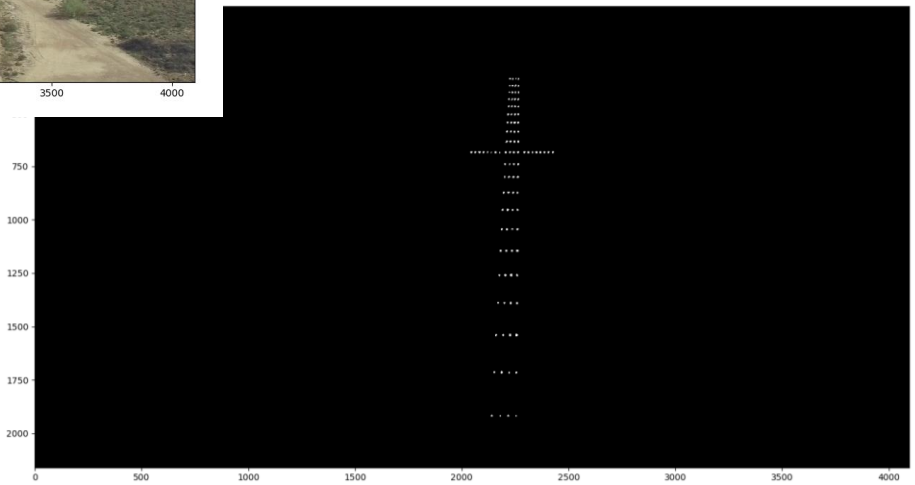
- **Positioning Drone and taking images in limit points of glide path and Protection Surface.**

- **Image processing:**

  - Lights finding and positioning.
  - Intensity and color analyse

- **Matching lights with drawing and generate report.**

3.2.ALS Murcia Airport



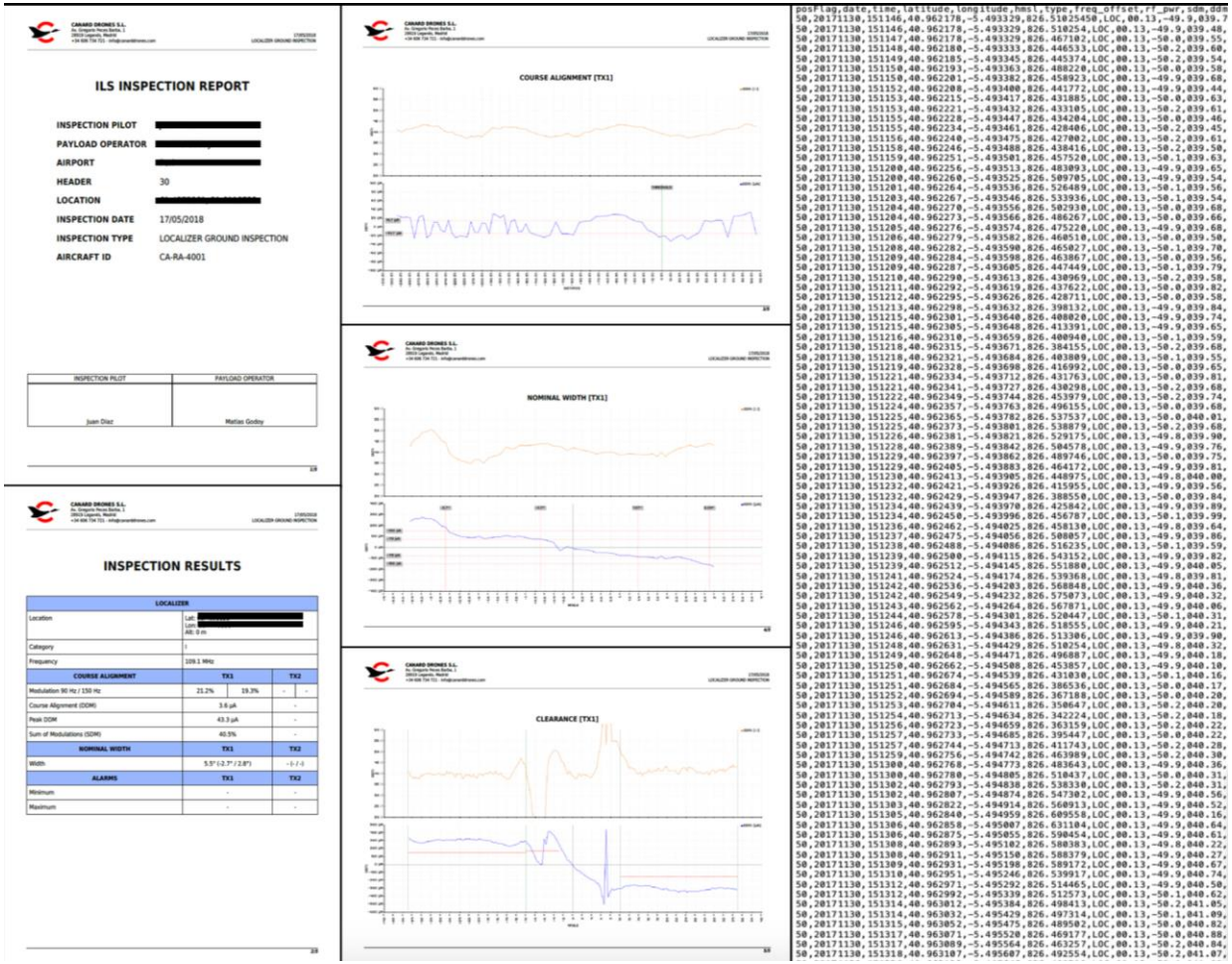
4.NAVAIDS.

4.1 Equipment

– Drone with power signal meter

4.2. Completed test

4.3. Generated report



ILS INSPECTION REPORT

INSPECTION PILOT [redacted]
PAYLOAD OPERATOR [redacted]
AIRPORT [redacted]
HEADER 30
LOCATION [redacted]
INSPECTION DATE 17/05/2018
INSPECTION TYPE LOCALIZER GROUND INSPECTION
AIRCRAFT ID CA-RA-4001

INSPECTION PILOT	PAYLOAD OPERATOR
Juan Diaz	Matias Godoy

INSPECTION RESULTS

LOCALIZER		
Location	Lat: [redacted] Lon: [redacted] Alt: 0 m	
Category	I	
Frequency	109.1 MHz	
COURSE ALIGNMENT	**TX1**	**TX2**
Modulation 90 Hz / 150 Hz	21.2% / 19.3%	- / -
Course Alignment (DDM)	3.6 µA	-
Peak DDM	43.3 µA	-
Sum of Modulations (SDM)	40.5%	-
NOMINAL WIDTH	**TX1**	**TX2**
Width	5.5° (-2.7° / 2.8°)	- / -
ALARMS	**TX1**	**TX2**
Minimum	-	-
Maximum	-	-

COURSE ALIGNMENT [TX1]

NOMINAL WIDTH [TX1]

CLEARANCE [TX1]

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Thank you!