Aena GBAS activities

GBAS PCG 02

FAA/MITRE, 14th December 2004

ENRIQUE MAURER-GNSS DIVISION

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Aena GBAS activities
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GBAS PROGRAM MOTIVATIONS

AND GOALS

GBAS PROGRAM MOTIVATIONS AND GOALS

ICAO AND ECAC STRATEGIES → GNSS FOR ALL PHASES OF FLIGHT → PA BASED ON GNSS

SAFETY
EFFICIENCY

PRESENT SITUATION → GNSS FOR ALL PHASES OF FLIGHT

SMOOTH TRANSITION
ICAO RECOMMENDATIONS AND PROCEDURES

GBAS CAT I EARLY IMPLEMENTATION ESSENTIAL! → GBAS CAT II/III

GBAS CAT I PROGRAM DESCRIPTION:

MALAGA AIRPORT

GBAS CAT I PROGRAM DESCRIPTION: MALAGA AIRPORT

Malaga airport currently operates with two ILS in RWY 14/32

GBAS CAT I implementation at Malaga airport is based on the following criteria:

- **MAJOR AIRPORT (4TH IN MOVEMENTS): Good exercise platform**
- **VERY GOOD SEASONAL TRAFFIC WINDOWS: Good flight trials platform**
- **IMPORTANT TOPOGRAPHICAL CONSTRAINTS: GBAS performances**
- **ILS AT RWY ENDS: Comparison of performances during first research step**
- **TMA IMPROVEMENT: Study of new GBAS capabilities (STARs/MA)**

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GBAS CAT I PROGRAM DESCRIPTION: MALAGA AIRPORT

GBAS Program at MGA airport is currently under contract with Honeywell and was divided in 2 phases:

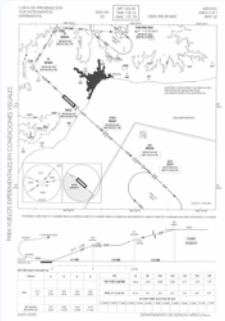
PHASE I (Experimental- No operational oriented) Finished

- Installation of SLS 2000 Ground station at MGA Airport

-Re-equipment an aircraft Beechcraft King Air with new GNSS sensors (GNSSU and VDL 500) for experimental flight trials.

-Design of new procedures. New procedure GBAS RWY 32 is just designed using ICAO PANS OPS design criteria (doc 8168, new Am.)

- EXPERIMENTAL FLIGHT TRIALS
- VDB ANALYSIS (FIELD STRENGTH AND COVERAGE)
- PROCEDURES DESIGN AND ATC INVOLVEMENT
- FLIGHT DATA EVALUATION AND ANALYSIS
- IMPROVEMENT OF ON BOARD CONSOLE AND TRAJECTOGRAPHY BASED ON TGO AND GRAPHNAV TOOLS
- SITING
- USE OF CURRENT INFRASTRUCTURE FOR CAT I UPGRADING



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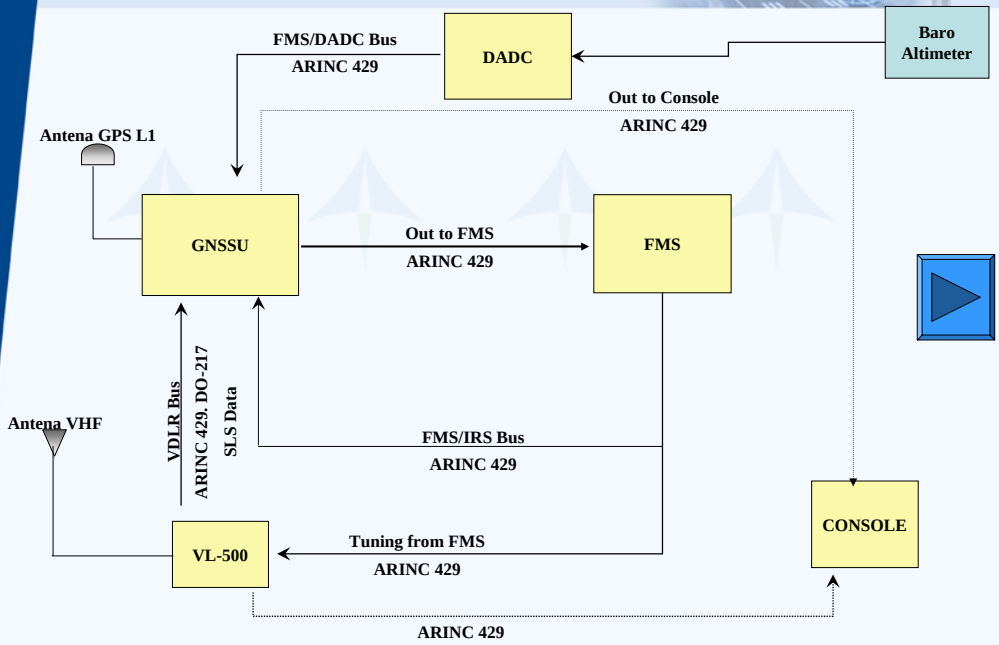
GBAS CAT I PROGRAM DESCRIPTION: MALAGA AIRPORT



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GBAS CAT I PROGRAM DESCRIPTION: MALAGA AIRPORT

GROUND
RINEX FILES

→ DIFFERENTIAL CORRECTIONS →

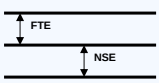
ONBOARD
RINEX FILES

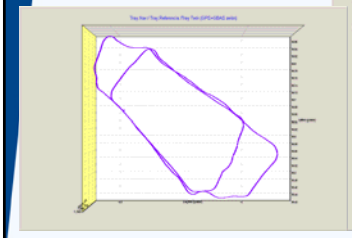
→ Reference Trajectory

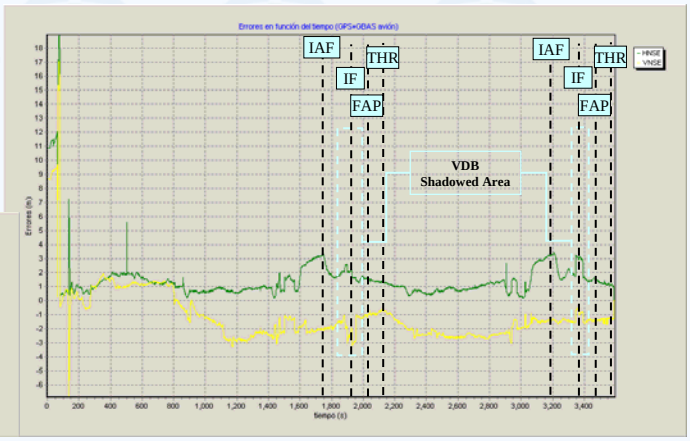
TGO

Theoretical trajectory: WPs approach
Reference trajectory: TGO (On board files GNSSU/Ground files comparison)
Navigation trajectory: Sensor (GNSSU)

NSE: Reference Trajectory-Navigation Trajectory







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GBAS CAT I PROGRAM DESCRIPTION: MALAGA AIRPORT

PHASE II (Operational oriented)

- CAT I upgrading
- Beechcraft King Air upgrading with new MMR ILS/GLS
- New procedures refinement
- Certification strategy: Based on certified GS, site and operational approval processes would be performed by Aena/CAA

IMPROVED FAT AND SAT
CLOSE MANUFACTURER
COOPERATION

TYPE APPROVAL???

ANSP ASSESSMENT
(EUROCAE MOPS)

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INTERNATIONAL ACTIVITIES

INTERNATIONAL ACTIVITIES

EUROCONTROL

-GBAS WORKING GROUP: RENAMED LATO (OPERATIONAL VALIDATION AND SAFETY ACTIVITIES)
-INSIDE SAFETY SUPPORT: FHA/CON OPS FINISHED+PSSA (ONGOING)
-GENERIC SAFETY ASSESSMENT CUSTOMIZATION (2005)
-NISG/NASG
-GBAS PCG

ICAO

-NAVIGATION SYSTEM PANEL NSP (TSG, CSG, GSG)
-OBSTACLE CLEARANCE PANEL (OCP)

EUROCAE

-WG 28 SG 2 (MOPS ED-114 FINISHED)
-WG 28 SG 4 CAT II/III (ONGOING)

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NATIONAL ACTIVITIES

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NATIONAL ACTIVITIES

GBAS CAT I SPECS (Based on ICAO SARPS A.77 and EUROCAE MOPS ED-114)

NATIONAL STRATEGY FOR GBAS IMPLEMENTATION (Based on operational considerations and smooth transition to GNSS based ops)

CERTIFICATION PROPOSAL FOR GBAS CAT I OPS (Allocation of tasks between Aena/CAA)

SITING CRITERIA FOR GBAS CAT I GS (draft)

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ONGOING ACTIVITIES

Aena GBAS activities

ONGOING ACTIVITIES

Since last PCG 1 meeting, several activities were performed:

- Two additional flight trials campaigns were performed at Malaga airport using the existing prototype ground station. Very useful results were obtained, improving the performances of the onboard console and post-processing tools for data analysis.

- The acquired experience and changes made in console and tools will be applicable for CAT I SIS post-processing.

- Internal review of the Certification proposal for CAT I GBAS was performed, taken into account the **potential delay in type approval activities** and the need to perform an assessment of the compliance of the GS with the EUROCAE ED-114 MOPS requirements (ICAO SARPs baseline)

- MMR upgrading of the Beechcraft: Meeting with Senasa/Rockwell-Collins 20th dec 04.

Aena GBAS activities

ONGOING ACTIVITIES

CAT I GBAS early implementation is consider essential both for early acquisition of the experience in GBAS ops but also as first step towards CAT II/III final goal.

Since **type approval processes are not clear close in the medium term horizon**, the certification proposal for CAT I is re-orientated as follows:

- **Technical assessment**: To show evidence of the compliance of the GS with the major part of the EUROCAE MOPS requirements. This would be done with an exhaustive FAT and SAT with the close involvement of the manufacturer. Some parts of the requirements would need to validate proposed doc from the manufacturer as evidence of compliance.

- **Site approval:** Would be done by Aena with appropriate use of ground tools and in combination with appropriate equipment of the Flight Inspection aircraft. Requested material will be presented to CAA.

- **Operational approval:** Would be done by Aena/CAA. Operational safety assessment will be customised from the generic safety assessment.

Aena GBAS activities

ONGOING ACTIVITIES

CAT I UPGRADING STATUS

- **Request to Honeywell** to prepare a customised upgrading strategy for the existing Malaga GS, based on **POTENTIAL stepped upgrading** with dedicated dates and milestones. SARPs compliance GS is under contract and delta budget allocation would be assumed for FAA NAS approved GS (if available) (TBD before JAN 05)

- **Request to Thales ATM**: Two dedicated meetings were taken in Madrid HQ and Malaga (initial site survey) with Thales ATM. (Upgrading proposal TBD by end 04)

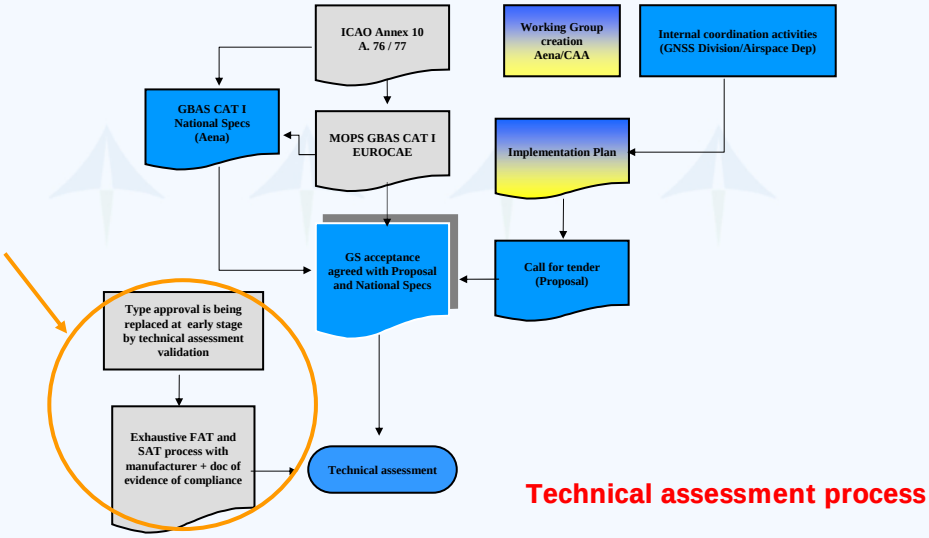
- **Improved FAT and SAT need to be prepared for EUROCAE MOPS tests assessment** (Honeywell case: Delta budget allocation proposal for intensive FAT/SAT)

- Use of **EUROCONTROL MARS tools** will be desired for both proposals. Two dedicated ground **end to end monitors** (THRs 14 and 32) would be installed.

- **Improved training activities** will be performed. Need to improve resources on GBAS for next short term research activities and validation assessment process.

- Use of **maximum of the existing ground infrastructure** is a premise, but dedicated **SITE SURVEY** (data campaign) is mandatory due to VDB improvement and GNSS reference receivers antennae multipath.

Aena GBAS activities
ONGOING ACTIVITIES



Technical assessment process

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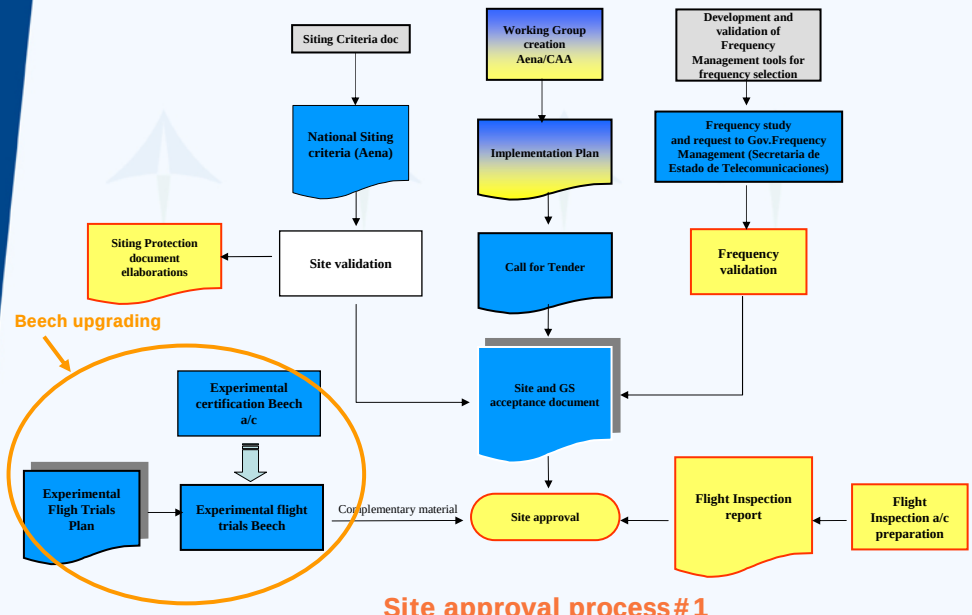
ONGOING ACTIVITIES



Site approval process#1

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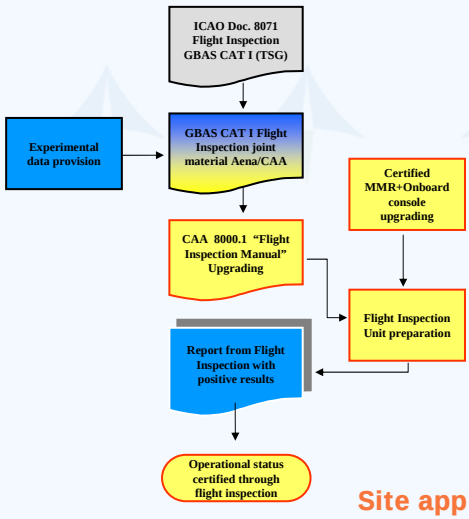
ONGOING ACTIVITIES



Site approval process # 2

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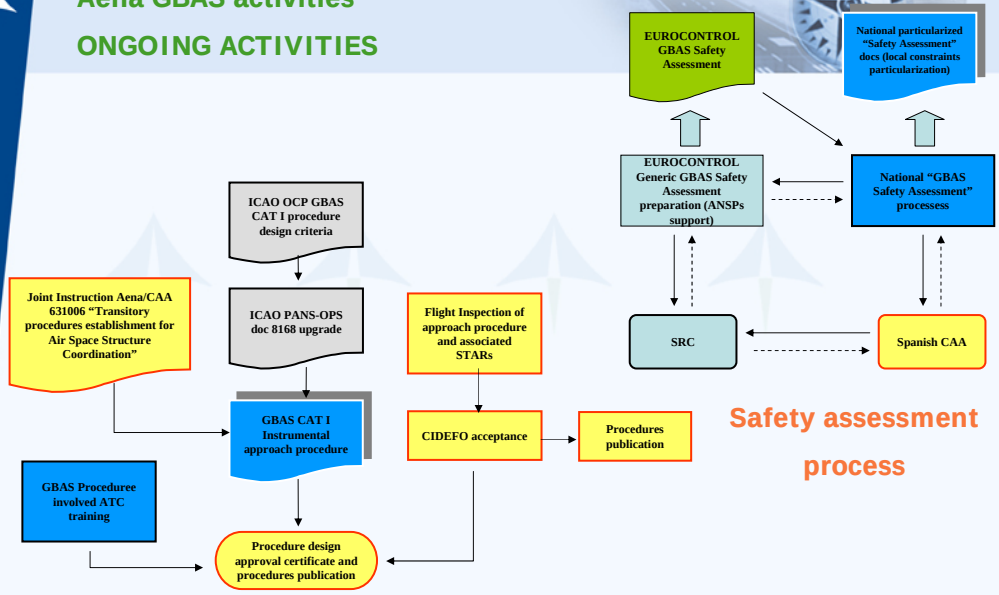
ONGOING ACTIVITIES



Safety assessment process

GBAS procedures approval process

Operational approval process # 1

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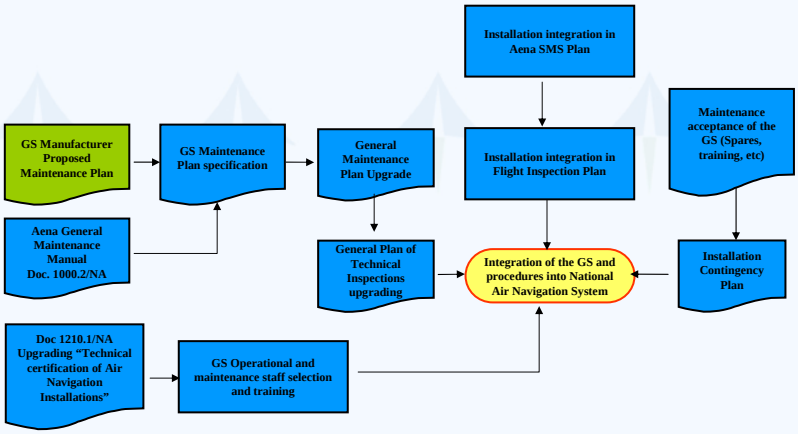
ONGOING ACTIVITIES



National Air Navigation System Integration

Operational approval process#2

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FUTURE ACTIVITIES: OPTIMAL CE

Aena GBAS activities

FUTURE ACTIVITIES: OPTIMAL CE

Ref. OPTIMAL Standard presentation (Public)

-**OPTIMAL is an EC VI FP air/ground co-operative project** to define new/enhanced operational procedures for approach and landing in order to increase capacity, efficiency and safety, and decrease noise exposure

-24 partners: 10 Core Team (Airbus France, DLR, Ineco, Eurocopter Fr, Thales ATM, Thales Av, Isdefe, **Aena**, NLR, EUROCONTROL EEC)+14 partners (including 3 additional ANSPs DFS; LVNL and ENAV)

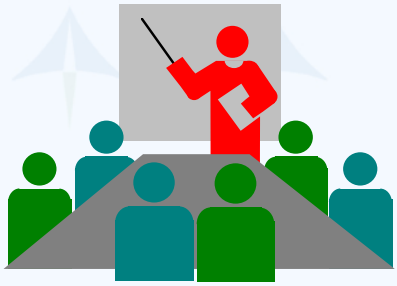
- Project is leaded by Airbus France

-GBAS Procedure Design activities: GBAS CAT I ILS look-alike and GBAS curved approaches (draft criteria). There will be also some GBAS procedures design for rotorcraft (Aena excope)

-GBAS CAT I ILS look-alike **flight trials at Malaga airport** scheduled for mid 07 with Beechcraft King Air and **Airbus France (A320)**

-**Project timeframe: 2004-2008, >2010 potential implementation**

Aena GBAS activities



Questions?

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