Navaids Flight Inspection

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FLIGHT INSPECTION PROCEDURES:

Different cases to consider affected by deterioration.

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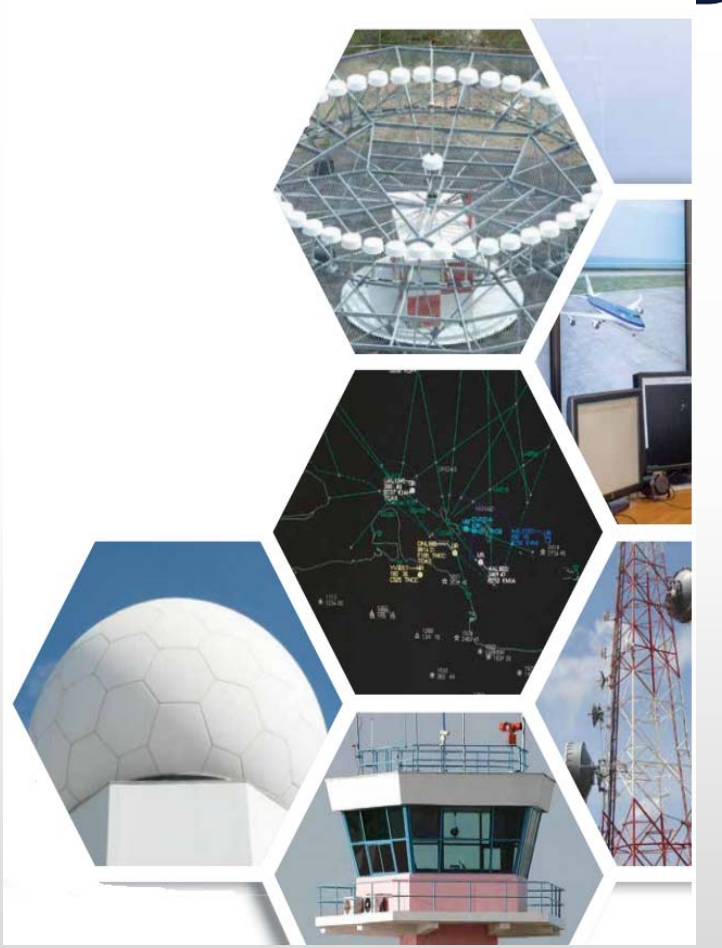


INTRODUCTION

As a result of the great investment made by Spain in "Research & Development" between 1988 and 1992, coupled with a program from the USA (1985 – 1992) the AFIS emerged – a technological breakthrough.

For the first time in the world, Spain put into operation in 1992, a fully autonomous flight inspection system. Surprisingly, it was called the Autonomous Flight Inspection System (AFIS)…

The AFIS focused on achieving total independence from any ground support and in the 2000 edition of ICAO DOC 8071, the AFIS was accepted into the TRNSG (ICAO working group) and included in the document as a new reference system for flight inspection.

Despite being an innovation, at no time were the procedures recommended by ICAO modified. The procedures were the same as those performed manually, but faster, without forfeiting any previous maneuvers and allowing for accurate measures on greater distances. The technological breakthrough did not impose changes or revision to the established processes: the AFIS was adapted to the existing procedures.

Flight inspection procedures must be defined by the Authority responsible for the flight inspection of each State, responsible for its airspace, in accordance with ICAO through the Chicago Convention. ***Manufacturers should never teach flight inspection procedures. Manufacturers should limit themselves to showing how their system works.***

Having said that, we are going to focus and reflect on some of the flight inspection procedures, which I will present and submit to the consideration of the professionals who perform the flight inspection activity. The examples are going to be,

- Flyability concept
- Analysis and presentation of the TO / FROM indication
- Security GS approach during FI at night
- GS alarms
- Analysis of the GS curvature
- Accreditation of professionals

- **Flyability concept**

It is a subjective and weighted indication of the real difficulty in tracking a signal in space, from which the safety and reliability of the trajectory followed by an aircraft is evaluated.

The flyability can not be evaluated at night by a pilot, unless he has been trained for it. It is a direct application of the concept of human factors.

- **Analysis and presentation of the TO / FROM indication**

Some manufacturers do not take into account the concept of TO / FROM, nor the adequate presentation for analysis and interpretation by the operator. It is a concept totally in use and very important.

- **GS safety approach**

It has to be done by day to apply the concept of flyability properly. If the flight inspection is carried out by night, the Aviation Authority should define a specific procedure, taking into account the maintenance personnel of the facility, as clearly indicated by ICAO.

- **Flights by night**

The Aeronautical Authority of each State must define a procedure in this regard, as indicated by ICAO. Also, the accreditation of the inspection crew is required.

- **GS alarms**

Some flight inspection service providers , perform the GS angle alarms at two points (maximum and minimum) during a single approach. This means inadequate training of inspectors and, therefore, lack of knowledge.

- **Analysis of the GS curvature**

The curvature of the GS, must be analyzed and the calculations performed according to distance differentials from the threshold. Some software perform the calculations as an average angle and the consequence is presentation of the tolerances in a straight line, which is inadequate.

- **Professional accreditation.**

The crew of the flight inspection aircraft must be accredited to carry out this activity and there should be a plan for their continuous training.

Plot of ILS

Curvature calculated by differential segments.

Any specific inspection (night, congested areas, etc.) must be fully planned and must follow a procedure developed specifically for these situations, which must be prepared and approved by the Aeronautical Authority. The inspection will be adapted to current regulations, both in flight inspection regulations and in the maintenance of facilities.

Doc. 8071, chapter I, paragraph 1.16, makes very general recommendations on the conduct of night flight checks. It recommends, just like Annex 10, the elaboration, by the States, of a regulation for all matters related to civil aviation.

Example: GS angle alarms.

When inspecting the GS angle alarms (high angle and low angle), each position must be completely flown, since there are possibilities that pilots use it for landing..

Some service provider checks it and considers the alarm good by making the descent on the nominal value in visual flight and shifts the values promptly. This is INCORRECT

EXAMPLES ANALYSIS

To understand the procedures and complete them successfully, we must first know and then teach what is the philosophy of a pilot in flight inspection, who would perform maneuvers to evaluate and classify a navaid, for the benefit of the pilots to maintain the confidence in the radiated signal and those who are using it daily

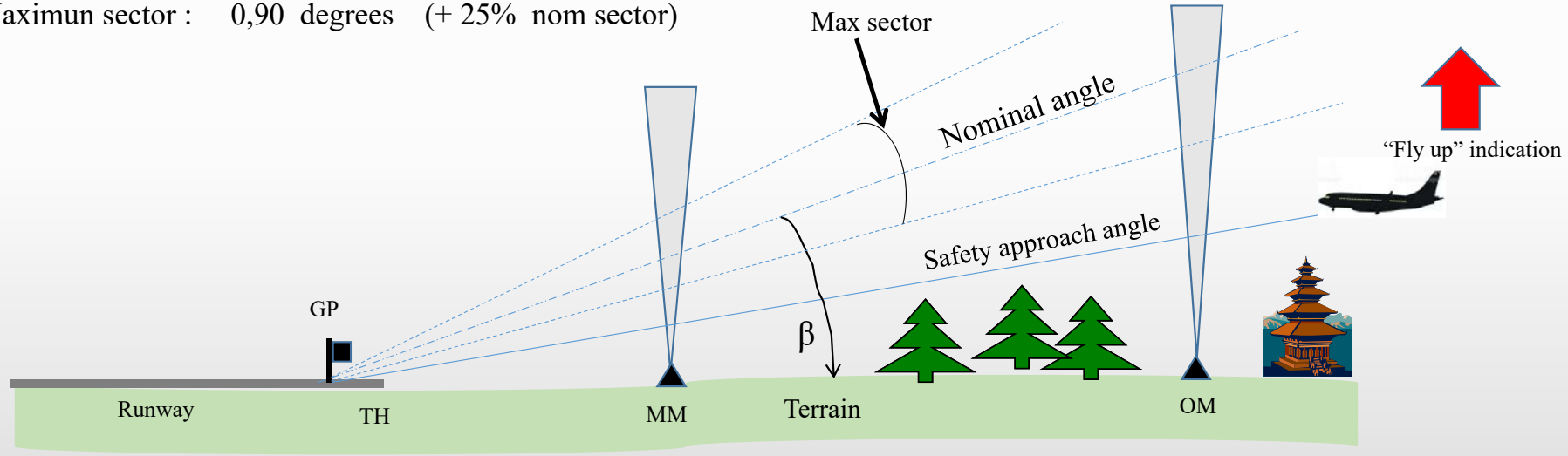
We talk specifically about the pilot, because it is in the flight inspection situation at night, especially inspecting an ILS, where this professional must apply the perception of flyability in a more questionable way. We are looking at the human factors.

We will explain this using the example of a safety approach in a GS inspection.

EXAMPLES ANALYSIS

Related concepts (just in case of system degradation):

Nominal angle GP: 3,00 degrees
Nominal sector: 0,72 degrees
LOW angle alarm: 2,78 degrees (-7,5 % CAT I)
Maximun sector : 0,90 degrees (+ 25% nom sector)



EHSI specific for FI.

Some manufacturers do not take into account the TO/FROM indication on the flight instrument, confusing this indication with inbound/outbound.

INSPECTION BY NIGHT

The flight inspection procedures of navaids and landing aids in "night hours“, must jointly include an air traffic control service, a navaids maintenance service and some elements related to all of this. But there must also be a regulation about it and in force, to work orderly and together.

ICAO Annex 10 and DOC 8071, give a guide to the requirements applicable to the flight inspection and ground inspection of conventional facilities, in situations of operation that can be considered normal, but give very generic recommendations for the flight inspection by night and require the States to develop the regulations and procedures.

The big difference between the night and day inspections lies in the pilot inspector and his subjective evaluation on the release of obstacles, so that the maneuvers are safe. Technology, nowadays, is not able to certify if these distances to obstacles are safe for aerial operation, because it implies perception - a human factor. Therefore, I repeat that the role of the pilot inspector is essential and irreplaceable, for the time being.

CONGESTIONED AREAS OF AIR TRAFFIC

We also need to look at an additional concept, given the increase in air traffic in some areas, resulting in a high level of air traffic congestion. There may be a need for the Aeronautical Authority of a certain State to declare an airspace as congested, by necessity at a given moment or, simply, for the commercial interests of airports, at the request of the flight inspection Organization.

In this case, the Aeronautical Authority must approve the modification to the standard procedures, so that the flight inspection ensures safe operation within the congested airspace. The modification of the procedures must aim to achieve the lowest impact in the operations of the airspace, leading to NO increase in operating costs and avoiding delays due to the flight inspection.

NEW TECHNOLOGIES

As new technologies appear, the UAV / RPAS are being introduced in the flight inspection activity. The objective is to make the flight inspection cheaper, promising a new and very healthy business.

At this point, I say categorically that I am not against new technologies, which broaden our societies horizons and can improve the quality of life. What seems dangerous to me is that the technique is not followed by regulations, which should be developed at the same time as the technology.

ICAO has already announced that the RPAS must be introduced to support the the flight inspection activity, together with an aircraft supporting this activity. They can also be entered in the equipment settings on the ground, as a complementary tool

A great problem to solve is the application of the concept of flyability, that is to say, all those parameters in which the subjective evaluation of the human intervenes. It is essential to normalize them, after carrying out a theoretical and practical study, which will be regulated at the same time.

Another issue to consider is the work of the air traffic controllers and flight levels to be defined for a RPAS in the activity of the flight inspection.

C O N C L U S I O N

The flight inspection is a program, usually annual, which guarantees the user's confidence in the quality of the radiated signal, which verifies by means of the inspection that the functions of the navaids and the associated flight procedures, comply with the relevant regulations for all published service volumes and are safe. Said *program* must always exist.

It is also important to take into account the need to require training for the professionals of the flight inspection activity. Such training can not come from the FIS system manufacturers, it has to come from qualified academic institutions.

Regulatory compliance is also done by adapting the standard procedures to different situations, but in this adaptation we must also take into account the ground maintenance personnel.


Thanks, for your attention !!!!!