CERTIFICATION OF AIRCRAFT WITH REGARD TO THE ENVIROMENT

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Air transport has become an integral part of today's society when trying to move passengers, but also the cost of long distance and in record time. Despite these advantages, it affects climate change and adds to the pollution of the environment. The European Union and umbrella organizations seek to minimize these negative associations and legislative activity. Their purpose is to develop certification specifications and guidance material to facilitate the certification of airworthiness of aircraft in order to protect the environment. A healthier future, however, more and more depends on the extent and quality of the activities, which as a whole will be able to reach humanity.

K e y w o r d s: certification of aircraft, environmental protection, certification specification, introduction of changes

1 INTRODUCTION

Air transport moves over 2.2 billion passengers annually and generates a total of 32 million jobs globally (of which 5.5 million work directly in the aviation industry). Aviation's global economic impact (direct, indirect and induced) is estimated at US$ 3.560 billion representing 7.5% of world Gross Domestic Product (GDP).

Air transport is one of the many of the major factors that affect the quality of the environment to the detriment of its boom. Among the negatives, which include air emissions, contamination of water resources and environment pollution by oil, heavy metals and chemical de-icers. At present, organization such as ICAO and JAA to EASA, trying to eliminate these problems and on the basis of the different regulations, but also the specification for the certification of air-transport by these gaps partially eliminated.

2 THE IMPACT OF AIR TRANSPORT ON THE ENVIRONMENT

The development of the aviation industry is a testament to the development of modern society. According to the volume of air traffic is expected to more than double by 2020. Due to the expansion of its negative effects on the environment caused by high fuel consumption, emissions, construction of airports, which are active on the climate change our environment.

Air transport's contribution to climate change represents 2% of human-induced CO_2 emissions (and 12% of all transport sources). Flights produce 628,000,000 tonnes of CO_2 yearly.

Worldwide, it is estimated that the equivalent of 1300 new international airports will be required by 2050 with a doubling in the commercial aircraft fleet. The challenge facing aviation is to meet the predicted growth in demand for air travel (increasing 4-5% per annum over the next 20 years) but to do so in a way that ensures that the environment is protected.

The European Union's efforts to minimize the impact of aviation through research and development studies on the environment. In this area, already have more than hundreds of research projects with a total value of tens of billions of Euros, while 30% of research was aimed at reducing the environmental impact of aircraft, in particular CO_2 and NO_x. Other projects were oriented towards a better understanding of the impact of aviation on the climate, greening, alternative fuels and reducing greenhouse gas emissions.

2.1 Negatives of the airline industry

The problems of air transport and industry, which are believed to be people behind the spurious emissions, noise and air pollutions are bad. These deficiencies are mostly acceptable near airports, where it is more visible. In fact, the more negative, which air-transport brings with it, and that you may not even realize.

The main deficiency is considered air pollution. At present, all the components that are known to be harmful, whether in a perfect combustion (CO_2, H_2O), but in particular those arising from the insufficient combustion (HC, soot, NO_x, SO_2). Increasing the concentration of these gases in the atmosphere, warming the Earth's surface that has an impact on climate change in the world.

Other of negatives is the energy needed for air transport. Annual consumption of aviation fuel by means of analysis of the ICAO is approximately 200 million tons per year. Therefore, we can conclude that the negative impact on the environment is adequate, its that consumed the quantity. Doing so constitutes only a small proportion of kerosene products per year from oil extracted in the world produces.

To the representatives of all sectors of the aviation industry, i.e. producers association, providers of airport and navigation services is to work together to plan for the greening of air transport. It is necessary to point out that everything is dependent on Government funding of research and development of new aircraft, engines and skeletons on incentives for the use of alternative fuels and the provision of modern commercial low-carbon infrastructure in air transport.

The priority is to achieve a leading position in a future structure of air traffic management systems. Must be carried out and the necessary investments in airport capacity and at the same time, the need to introduce clearer rules on airport charges, negative environmental

effects caused by measures to combat a sharp increase in traffic and at the same time maintaining the competitiveness of the sector and taking into account the criteria must be in accordance with the ICAO.

The introduction of the measures, such as improving and optimizing the management in many areas of air transport, the development of technology and innovation of aircraft and engines, the air becomes more efficient and make use of the economic incentive traffic tools, for example. The inclusion of the climate impact of the aviation sector in the Emissions trading System EU15.

The European Union is committed to preventing climate change by limiting warming to a degree that requires the need to reduce emissions by 15-30% by 2020 and 60-80% by 2050. Over the years, 1990 and 2003, emissions from international aviation increased by 73% in Europe. It even implies that the overall impact on climate change than the impact of carbon dioxide emissions two to four times greater. On this basis, it is necessary to deal with the negative impacts of air transport on the environment through the adoption of various measures and to promote activities aimed at the development of new engine technologies and alternative fuels.

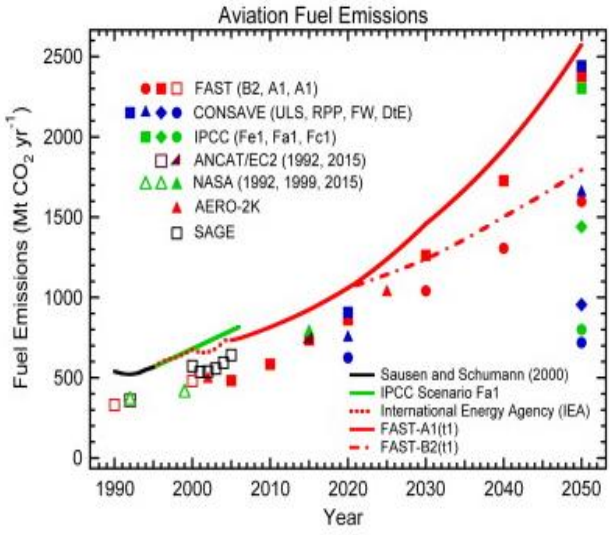


Fig.1: Historical and present-day inventories, and future projections of civil aviation CO_2 emissions from a variety of sources: AERO2K, ANCAT/EC2, CONSAVE, FAST, IPCC, NASA and SAGE. The open symbols indicate inventory analysis and the closed symbols indicate projections. Also shown are the CO_2 emissions implied by IEA fuel sales statistics. The IEA data represent the total of civil and military usage because all kerosene sales are included. The solid (dashed) lines for FAST-A1 (B2) scenarios (evaluated with the t1 technology option) and the IPCC Fa1 scenario also account for all fuel sales in order to be consistent with the IEA values ending in 2005. In the figure legend, the FAST, CONSAVE, and IPCC symbols are shown in an order that matches the scenario labels in the parentheses in each case.

3 AIRCRAFTS CERTIFICATION, AIRCRAFT PARTS AND EQUIPMENT FROM THE POINT OF VIEW OF ENVIRONMENTAL PROTECTION

Commission of the European Communities Regulation (EC) No 1702/2003 and its amendment lays down the rules for the certification of airworthiness of aircraft and related products, parts and appliances and aircraft certification of environmental protection, as well as for the certification of design and production organizations. The aim of this regulation is to lay down common requirements to ensure a high uniform level of civil aviation safety and environmental protection.

This regulation contains rules, technical requirements and administrative procedures for the airworthiness of aircraft, products and equipment to ensure compliance and the protection of the environment. The following requirements and procedures laid down conditions for the issue, maintenance, modification, suspension or revocation of a certificate.

Also, organizations involved in the design and manufacture of products, parts and appliances, aircraft should meet certain technical requirements in order to demonstrate their capability and means of discharging its responsibilities and rights.

The need to ensure uniformity in the application of the common requirements for aeronautical products, parts and appliances in the field of aircraft airworthiness and environmental protection requires that the competent authorities of the Member States and, where appropriate, for the purpose of assessing compliance with these requirements in accordance with EASA have been common practice.
On the basis of the conditions laid down for:

- the issue of type-certificates, restricted type-certificates, supplemental type-certificates for special purposes, and changes to those certificates,
- the issue of certificates of airworthiness, restricted certificates of airworthiness, permits to fly and certificates for special purposes on the release of the authorized person,
- the issue of repair design approval,
- licenses to comply with the requirements for environmental protection,
- the issue of noise certificates of competence,
- the labeling of products, aircraft parts and equipment,
- certification of design and production organizations,
- the issue of licenses to the continuing airworthiness.

The main idea was to create such a certification system, which defines the certification specifications and guidance material to facilitate the certification of airworthiness of aircraft in order to protect the environment.

4 THE INTRODUCTION TO AIRCRAFT CERTIFICATION

4.1 The certification

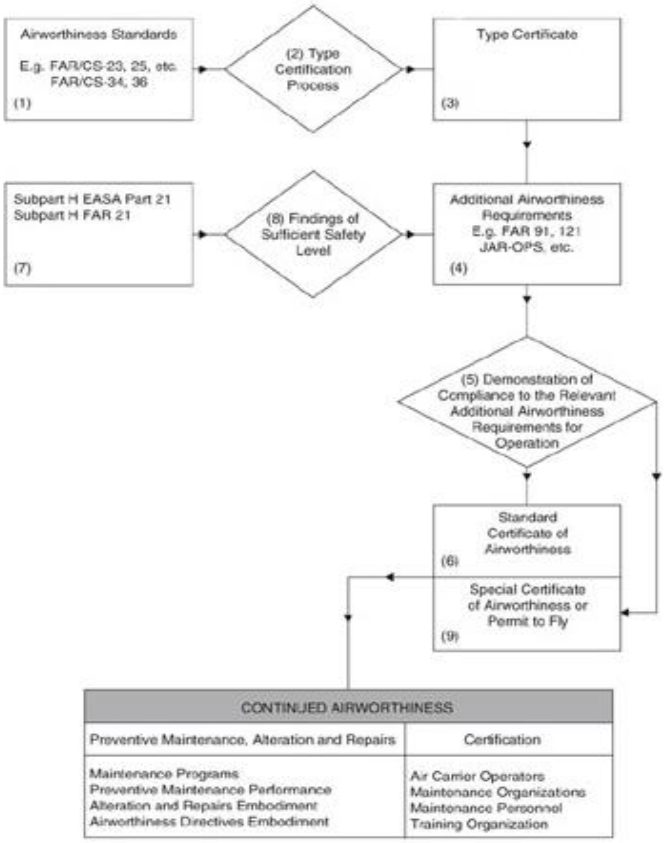
The operational life of an aircraft begins with the issue of a certificate of airworthiness or equivalent document, as has been shown in this chapter.

We have described that such a certificate can be issued either because the aircraft has been found to comply with a type certificate or, having not met (or have not been shown to meet) applicable certification specifications, it has been found to be capable of safe flight under defined conditions.

Because the same aircraft can be used in different kinds of operations, besides the basic certification requirements the aircraft also has to satisfy the requirements issued by the authority for each particular kind of operation.

For example, a single-engine FAR 23 airplane can be operated for personal use or for compensation or hire (aero-taxi, aerial working, etc.), but also according to different flight rules (VFR, IFR, etc.). Depending on the particular type of operation allowed, additional airworthiness requirements, which influence the airplane's configuration, shall be complied with (equipment, instruments, etc.).

To better illustrate the above remarks, Figure 4.1 presents a summary of the certification of an aircraft from design to operation.



4.2 Determination of the certification basis and applicable environmental protection certification specifications

An initial certification basis and an initial determination of applicable environmental protection certification specifications shall be developed and fixed as early as possible, having regards to airworthiness codes and taking into account the procedure specified.

When decided, the initial certification basis and the applicable environmental protection certification specifications shall be notified to the applicant in writing, including a reference to the possibility for appeal as specified in articles of the basic regulation and published in the official publication of the agency. Disagreements may also be handled in accordance with the procedure as specified at the request of the applicant.

The initial certification basis shall be changed as necessary to address new applied Technologies, introduction of design changes, discovery of unsafe conditions. The process for such changes is the same as for the establishment of the initial certification basis.

When finally decide, taking into account the result of a disagreement procedure, the certification basis and the applicable environmental protection certification specifications shall be recorded in a Certification Review Item document. Deviations, useful interpretations of acceptable means of compliance not covered by published guidance material will be recorded in a separate certification review item document.

4.3 The design and certification

The type design of a product, which must be adequately identified according to EASA Part 21 (paragraph 21A.31) and FAR 21 (paragraph 31), consists of:

- The drawings and specifications, and a listing of those drawings and specifications. They are necessary to define the configuration and the design feature of the product shown to comply with the applicable type certification basis and environmental protection requirements.
- Information on materials and processes and on methods of manufacture and assembly of the product needed to ensure the conformity of the product.
- An approved airworthiness limitations section of the instructions for continued airworthiness as defined by the applicable airworthiness code.
- Any other data necessary to allow, by comparison, the determination of the airworthiness, the noise characteristics, fuel venting, and exhaust emission (where applicable) of later products of the same type.

5 THE IMPLEMENTATION OF THE FUTURE

It is now the driving force behind the growth of international air transport market and industry. The multiplication of routes in Europe contributed in particular to the restructuring and integration of regional airports, which has brought considerable benefits for customers, the arrival of low-cost carriers. The European Union can be proud of the equipment, as well as the quality of air transport services. The basis for the expansion of the market is improving the performance of all segments of the aviation industry, airports and air navigation services. Building a strong infrastructure not only in the air, but also on the ground, in particular the creation of the single sky will clearly increase the efficiency of air transport in Europe.

5.1 ACARE and the environmental objectives

The aviation industry in Europe has long recognized this challenge and in 2001 the Advisory Council for Aeronautical Research in Europe (ACARE) established the following targets for 2020 (compared to 2000):

- reduce fuel consumption and CO_2 emissions by 50% per passenger kilometers,
- reduce NO_x emissions by 80%,
- reduce perceived noise by 50%,
- make substantial progress in reducing the environmental impact of the manufacture, maintenance and disposal of aircraft and related products.

ACARE has identified the main contributors to achieving the above targets. The predicted contributions to the 50% CO_2 emissions reduction target are:

- Efficient aircraft: 20-25%,
- Efficient engines: 15-20%,
- Improved air traffic management: 5-10%.

5.2 Towards 2050

With 2020 now not far off in terms of civil aircraft development cycles (typically 10 - 15 years), ACARE has been evaluating the progress towards the 2020 targets and conducted a consultation process to identify priorities for a new vision for 2050 ('Aeronautics and Air Transport: Beyond Vision 2020 (Towards 2050) Background Document', June 2010).

It is clear that these longer term targets will be at least as demanding as the ACARE 2020 targets and it is widely accepted that to achieve these longer term aims there will need to be a significant step change in the technologies of future aircraft as well as operational changes.

ACARE now believes that the time is right for a high-level 'Group of Personalities' to come together and develop a new vision for European Aeronautics and Air Transport.

6 CONCLUSION

Air transport is a key strategic element of the transport in the future. The constant pressure of economic growth and mobility companies receive air transport to the fore, but on the other hand, increase the negative effects on the environment. An important objective is to reduce the burden on the environment by means of modern technology, aircraft and technology. This is an ambitious goal, but at the same time leading to what can be most effective and considerate treatment, with resources and the environment in which we find ourselves. Environmental protection is an essential condition for the existence and further development of the company.

Care for the environment means the preservation of the fundamental values, the creation of new structures and administration in matters relating to the creation and protection of the environment with the applicable legislative instruments, education, training and public awareness.

Now it can be observed, as the engineers are moving forward in the technical solutions, however many times it remains an unanswered question of secondary effects on the company. There is a need to monitor the quality of the solutions in their complexity and entire width. The future will increasingly depend on the extent and quality of education, which as a whole will be able to support humanity.

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