

Sample research paper on certifications in aviation

[Engineering](#), [Aviation](#)



Flight (Aviation) operations facilities are heavily reliant on adequate flight maintenance. The combination of aircraft equipment readiness, efficient use of workforce, and information ensure the security and success of all flight operations. However, the proper and productive maintenance of the operation facilities underpins it all. According to Transport Canada, aviation safety and efficiency relies on the continuous analysis of the Aircraft Certification Functions (2014). This paper, therefore, provides contextual information regarding flight certification considerations relating to modifying aircrafts and its facilities. The backdrop of the data is in Accordance with FAA and other international standard protocols such as the Civil Aviation Safety Regulations (CASR). For the purpose of this document, an aircraft modification refers a change in the physical characteristics of an aircraft attributed to a corresponding change in its initial production specifications. It further can refer to a sanctioned alteration of an aircraft bodily parts already produced.

Throughout the world, flight modification qualifications and certifications are varied. Aircraft type, the modification facility, and the professional's (technicians') job dictate these variations. For instance, an Australian aircraft are only subject to change by a qualified technician under the provisions of CASR Part 21. Under these provisions, the modifier (mechanic or technician) undergoes several trainings and work experiences, and pass both a piece of knowledge and a practical test. Similarly, Part 65 and 61 of the Federal Aviation Air Regulations lists the qualifications, certifications, and limitations of an aircraft mechanic in the US. According the Aviation Safety Bureau, these individuals are an essential piece in the aviation maintenance and

safety puzzle (2010). Under the FAA and European Aviation Safety Agency (EASA), flight mechanics is responsible for maintaining the set aeronautical operational standards.

The classes of modifications relate to aircrafts certificated in USA. It can also apply to flights certificated overseas and then accepted for use in the affected country such as the U. S. Such an application is however only permissible through the issuance of a Type Acceptance Certificate (TAC). The award of TAC to an aircraft is under the purview of Civil Aeronautics Administration (CAA) (FAA). The TAC certification award confirms the satisfaction of the prevailing airworthiness requirements (Aerofiles. com). In Australia, for example, amateur-built aircraft operating under the Experimental Certificate system are also exposed to modification projects (CASA, n. d.). In most countries including the US, The Supplemental Type Certificate (STC) process is one of the various methods underpinning the aircraft design approval. Nevertheless, once modified, fully type-certificated aircraft must continue to meet the requirements of their certification basis and the associated airworthiness standards. With those types of changes that have significant flight type implications, continued fulfillment of the relevant clauses of the airworthiness standards requires the fulfillment of some form flight-testing assessment.

Aircraft modifications aim at changing the function, performance or the operation of an existing flight. A change in the characteristics of the aircraft, its propeller, or engine is for achieving a desired capability for that particular aircraft. In its operational life, the aircraft will experience wear and tear that warrants its modification or repair. Malfunction, accidental damage or

fatigue, and environmental deterioration play important roles in the flights' deterioration. Regardless of the cause in change of the original design, an aircraft repair is a corrective maintenance function intended to restore an aircraft back to its approved type design. Just like modification, aircraft repair must be in accordance with the Airworthiness Standards of the United States of America or to the country in question. In discussing these aircraft changes, it is paramount to understand that aircraft modification varies in design philosophy, complexity, and the magnitude, and by technological application. It comes in two forms: changes that add new equipment (features) to the aircraft and those that reinforce the flights initial integrity (Hertzler, 2008). Concisely, aircraft modification is categorized as either a major change or a minor modification. By definition, major flight modifications have appreciable effects on the airworthiness of the affected aeronautical product. Consequently, applicants for such a change are required to evaluate the technical merit of the modification and assess its effect on the affected aircraft. Usually, the intensity of such effects depends on the complexity and magnitude of the proposed change. Minor modifications are aircraft design changes that have a negligible effect on the structural strength, dependability, or operational characteristics of the aircraft. However, the feat of such minor modifications customarily implicates the use of standardized accepted practices. (FAA as cited in Hertzler, 2008).

The approval process for any aircraft design change seeks to ascertain the compliance of the proposed flight change with the applicable Airworthiness and Environmental standard. Such changes should ensure that the affected

aeronautical product, when altered, will continue to have a valid and approved type design. In most countries, the Type Certificate Data Sheets (TCDS) of an aircraft usually identifies the detailed certification basis under which the type design of the product was approved. In the USA, the FAA extends the TCDS to an Amended Type Certificate (ATC). According to the FAA, ATC approves the aircraft modification as well as the effects on the original design (2011). In conjunction with the ATC, a Supplemental type Certificate (STC) is a national aviation authority certificate that authorizes major flight modifications and repairs to existing type certified aircrafts, flight engines or propellers. STC is “supplemental” in the sense that it adds value to the existing type certificate (Willson, 1996). In the US, such certificates are issued by the FAA.

Like other aviation modification certificates, an STC is a certificate that defines the flight design change by stating how the modification affects the original design. An STC also recognizes the certification basis and lists the specific regulatory compliance for the design change. Such information assists applicants in proposing subsequent aircraft changes and assessing the compatibility of their certification basis with other STC modifications. In qualifying for aviation certification, an individual is required first to complete a Federal Aviation Administration Knowledge Test (FAAKT) at the end of the ground instruction course. After obtaining the FAAKT, one must pass a practical test.

An aircraft mechanic (technician) certification also falls into the same pattern. Part 65 of the Federal Aviation Regulation (FAR) guidelines lists the qualifications and privileges for flight mechanics. These privileges

encompass all the necessary preemptive maintenance and the ability to supervise, delegate and manage flight maintenance. A mechanic certification also empowers the technician to do repairs approved by a rated mechanic or administrator. For example, in Contemporary Army Aviation Maintenance System (CAMS), flight mechanics conduct regular inspections of aircraft equipment and associated tests. At this flight maintenance level, approval ratings by flight administrators support the Aviation Unit Maintenance's (AVUM) daily operations.

Depending on their area of specialization, flight mechanics performs periodic aircraft inspections, flight structural repairs, maintenance, and adjustments on a multiplicity of different aviation components. The primary flight specialties include airframe adjustments, avionics, and power plant engineering. These individuals acquire an array of certifications mainly from the Aviation Maintenance Technician Schools and EASA. Additionally, advisory circulars (AC's) supplement the FAA certification exams (Aviation Safety Bureau, 2010)

In conclusion, Aircraft certification serves two most fundamental objectives. Firstly, the aircraft certification boosts and fosters the development of civil aviation. Secondly, the certifications ensure aviation safety. One method used by the FAA, EASA and other regulatory bodies in fulfilling these objectives is using the aircraft certification system. The FAA underlines the protocols for the approval of aircraft design modifications.

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