



Certification Database – Quick Reference

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1. Introduction

The certification of an aircraft is a very complex process which guarantees that the aircraft complies with a given specification. This specification may be aircraft specific or may be an approved requirement (FAR, MIL, ...). The specification defines the certification basis and must be approved by the certification authority.

There is an immense set of data which must be managed during a certification process. This data refers to the certification specification, aircraft system definition, certification documents (drawings, reports) and company structure (departments, certification team). A lot of links must be defined between different entities (for instance between specification paragraphs and certification documents).

The certification process is not a static one. It is practically finished only when the last aircraft doesn't fly any more. A lot of modification occurs during and after the development process. Each significant modification generates changes in the certification documents which must be approved by the authority.

This whole process is a typical Relational Database task. A Relational Database Application can control very efficient the "certification history" of an aircraft type. The present Certification Database is an MS-Access application and is working also in a computer network. MS-Access has a "user friendly" interface based on Forms and Reports. The Forms are interactive screen masks. The reports may be seen on the screen and then printed.

By means of controls the user may navigate through the whole certification process, get, write and modify data, analyse the certification status by means of queries and print ready certification documents. A context sensitive help system is integrated.

The general concept of this application was "transparent access to all certification documents" beginning from the specification up to the certification documents. Each member involved in the certification may see the certification data but only the responsible ones may change it. There is a complete "see" access and a selective "edit" and "write" access. The certification staff has full "edit" and "write" access. The access priority is defined by means of an identification code which must be introduced when entering a project.

There is another advantage in using the certification database: the "know-how" generated during a certification process may be reused for another similar certification or for a whole family of aircrafts. An immense amount of time may be saved in this way. The Certification Database improves the efficiency of the certification process. This is a need in the development process of a modern product by saving time and money.



2. Certification Procedure

The civil aeronautical authorities together with the industry fixed in the last twenty years a very clear procedure for the whole certification process. This procedure guarantees that no lack exists in the complete certification compliance process. Due to the approved efficiency of the civil certification process, a lot of military companies try to implement this procedure in order to save money and time.

The certification is controlled and approved by the certification authority. The "Office of Airworthiness" of the aircraft company has the certification responsibility for the industry. A very important characteristic of the civil certification process is that a significant part of the certification responsibility is moved to the Office of Airworthiness of the industry. This office must be approved by the certification authority. The internal organisation of the certification process of the company is defined in the "Design Organisation Manual". This manual must be also approved by the authority. The company itself must be approved as a "Design Organisation".

The following steps must be complied with during a certification process:

a) Define the certification basis

The certification basis is defined by a "Certification Specification" which includes all the requirements the aircraft must comply with. This specification may be defined by the industry together with the client and approved by the authority, or may be defined in an already approved requirement like FAR, JAR. In this case there are normally also some supplementary "Special Requirements" which must be complied with. The "Special Requirements" are "aircraft type" specific and are defined during a dialogue between the authority and the industry in order to comply with particular characteristics of the aircraft.

The certification basis must be approved by the authorities of all the countries in which the certification will be performed.

b) Make a detailed certification expertise. This should be done by a team with enough certification experience in order to discover in a beginning design phase critical certification items and appreciate the certification financial effort.

c) Complete the Design Organisation Manual. This manual defines the whole internal organisation and procedures of the design and certification office.

d) Define an identification system for the aircraft and the compliance documents.

Define the A/C systems. All the aircraft systems and their functions must be defined. An identification system based on a code system (ex. ATA 100) must be defined. A code system must be defined for the compliance documents in order to identify and filter documents (ex.: drawings, calculations, tests,...).

e) Complete the "Means of Compliance" (MOC) list

Each paragraph or subparagraph of the specification (certification requirement) must be complied with by means of specific tasks. These task must be defined by the industry and approved by the authority in an early stage of the certification. The task



are divided in different task types each of them representing a special category of compliance (ex.: drawing, calculation, structural tests, flight tests, inspections, ...). An identification number is assigned to each task type. A complete matrix including all the requirements (paragraphs/subparagraphs) and their corresponding compliance tasks must be completed. This matrix is named "Means of Compliance" (MOC).

f) Define the certification documents

Also if in the early stage of the certification not completely possible, it is the best procedure to define as soon as possible the certification documents which must be completed (descriptions, tests, calculations,...). This will be very useful in the controlling activity of the certification process.

g) Define the links between paragraphs/subparagraphs and the compliance documents

Each paragraph/subparagraph must be complied with by means of documents, so that a link must be defined between each paragraph/subparagraph and the corresponding documents. By means of this link and the relational capability of a database the inverse link between the compliance documents and the paragraphs/subparagraphs which must be complied with may be defined. This is very important in the very beginning of the certification process when the responsibilities for each certification documents are defined.

Note : The Certification Program is now finished. The certification has a very great importance for the whole design and certification process. This program will be approved by the authority and will give the "green light" for the whole certification work. In the same time this program defines the financial effort for the certification which is also very important for the investors.

h) Define the Certification Team and their responsibilities

A certification team which complete the certification documents must be define. The following responsibilities must be defined: paragraph responsibilities for the "Compliance Summaries" (prepared, checked, approved), Compliance Documents responsibilities (prepared, approved).

i) Complete all the Compliance Documents

j) Write the "Compliance Summaries"

The certification authority can not verify all the compliance documents. This would be an immense amount of work. For this reason a standard procedure was introduced in the civil certification process. The Certification Staff has the responsibility to write the "Compliance Summaries" which describe for each paragraph/subparagraph and in a very concentrated language the compliance procedure, list the most important results (if needed) and refers to the compliance documents. In this way the certification authority can in a relative short time analyse and validate the compliance process. The authority analyse the complete documents only by means of sampling. The "Compliance Summaries" are the certification "mirror" from the authority point of view. The "Compliance Summaries" must be actualised after each change.



3. How to use the database ?

3.1 Start the Database application:

3.2 Select a project and click on "ENTER" to enter the project

3.3 Enter your identification code:

There are two branches in using the database: **"Build" and "Work"**

The "Build" branch defines the main structures like : Specification (Requirement), Aircraft System codes, "MOC" codes, Documents, "MOC" list.

The **"Work"** branch is used for the following tasks:

- to define the responsibilities for certification documents and "Compliance Summaries"
- to establish the links between Paragraphs/subparagraphs and documents
- to see and print the certification reports
- to access certification statistic data .

3.4 The "Build" process

3.4.1 Define the MOC types (click on "MOC Types")

A number or letter is assigned to each type of certification activity

3.4.2 Define the document types: Two letters define each document type (click on Doc. Type).

3.4.3 Define the countries in which the certification will be proceeded. This information is needed for particular "Special Conditions" (click on "Countries")

3.4.4 Define the Specification / Requirement chapters (click on "Chapters")

3.4.5 Define the Paragraphs by means of code, name and text. The reference to Chapter should be also completed (click on "Requirements")

3.4.6 Define the company departments (click on "Departments")

3.4.7 Define the certification team (click on "Names")

3.4.8 Complete the MOC list (click on Moclist)

3.4.9 Define the Aircraft System Codes (click on "System")

3.4.10 Complete the Document list (click on "Documents")

3.5 The "WORK" process.

3.5.1 Compliance Summaries:

- select a chapter
- select a paragraph
- click on "Paragraph": you have the possibility to define the responsibility persons for the paragraph. A date for the Compliance will be also defined. When finishing



click on "Exit"

- in the "Project Form" click on "Compliance Summary"
- Select a subparagraph with the "Next" and "Back" buttons.
- You have now 3 views to select: View Edit, Compliance and Document-Flags
- Complete the Compliance Summary and the Compliance view.
- Edit the MOC List (if is needed) in the View Edit view.
- Complete the reference paragraph to documents in the Document-Flags view (by means of a double click on a document in the lower document list). By means of a double click on the reference list you may delete a reference.
- click on "Flag-Doc" to define the links to the corresponding certification

3.5.2 Access to Documents.

- select a system
- select a document type
- all the corresponding documents will be listed
- assign the "Prepared" person
- assign the "Approved" person
- in the "File" box you can introduce the path/name of the file where the document is stored (a hyperlink is defined). In this way the document may be directly accessed.
- select the date and issue of the document and if the issue is greater then 1 complete the "Replace" date (previous edition)
- the paragraphs the document must comply with will be automatically listed.
- There is also the possibility to see a list of all documents (click on "AllDocs")

3.5.3 Reports. The following reports may be accessed and printed:

- "Means of Compliance " list
- Compliance summary list
- A list with all the paragraphs
- A list with the paragraphs for which each person is responsible
- A "Compliance Check List"
- A "Requirement Summary" list in which for each paragraph the following informations are listed:
 - Chapter number
 - Par. Number
 - MOC list
 - The text of the requirement/specification
 - The responsible person for the par.
- A document list in which all the documents are listed including the responsibilities and status.
- A Document Cover page
- A list in which for each document the paragraphs which must be complied with are listed.
- A Document responsibility list in which the documents are filtered by means of the responsible person.
- A system list in which all the aircraft systems are listed

3.5.4 Statistics.

Statistics are screen filters which provide controlling information with respect to the certification status. The statistics refers to paragraphs or

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documents.

The status refers to: responsibility, date, system, country.

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