Certification Management Application
Tool for Aircraft Certification Management
project area
lookup tables
versioning area
Introduction

The certification of an aircraft – or modifications to an existing aircraft design – is a complex and time consuming task within your organisation. To support you performing this task, NLR has developed a flexible application called ‘Certification Management Application’ (CMA). CMA supports you as the certification engineer in managing the large amounts of data and information generated during the certification process more effectively and provides consistent guidance throughout the whole process. CMA has been successfully introduced for the Research Aircraft Design Organisation of NLR and the design part of the NLD Defence Materiel Organisation.

Tasks below are part of a typical certification process:
- The applicable airworthiness code and requirements must be established;
- Often a large number of requirements must be dealt with, based on several interlinked standards;
- For each requirement, the means of compliance must be selected, and evidence needs to be collected;
- All steps in the certification process need to be administered, including the documentation of several formal decision moments.

Scope

The CMA can be used for certification projects involving civil or military aircraft or aircraft modifications for fixed wing aircraft, rotorcraft and RPAS. Although the user of this application still needs good knowledge and understanding of the certification process and has to be trained in the specific technical area under consideration, the CMA is invaluable in managing the large amount of information involved in the process which is depicted in the figure below.

The application can assist the certification engineer with:
- Preparing the certification base;
- Establishing applicable requirements;
- Selecting the means to demonstrate compliance;
- Generating input for the certification plan(s) and certification report;
- Defining substantiation data for compliance demonstration of requirements;
- Generating certification compliance reports;
- Keeping track of certification status including generation of status reports.

It is not always required to use the full capability of the CMA. In many cases using only a subset of the CMA features was found to be extremely helpful.

The CMA currently runs stand-alone on a standard Windows PC with MS Office Access 2010. The workflow for CMA maps onto the stages as identified in a generic Certification Process:
- Determining the applicability of documents and requirements;
- Establishing the means of compliance to the requirements;
- Verification and validation of meeting the requirements.

The application can generate baseline reports for these three stages, which will be part of the Certification Plan (CP) and Certification Report (CR).
The relationship between the different CMA components.
Application architecture

CMA set-up
The CMA application consists of a set of databases and a front-end module:

<table>
<thead>
<tr>
<th>Front-end</th>
<th>Reference Documents database</th>
<th>Project database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphical User Interface (GUI) with interactive forms</td>
<td>Certification Specification documents repository</td>
<td>Project details, contents and status</td>
</tr>
</tbody>
</table>

The GUI is used to access the read-only Reference Documents database and to fill the Project database by creating documented references to the Reference Documents database. From the Project database, reports can be generated at the different stages of the certification process.

Reference data
The current Reference Database is made up of the tree view items shown in the figure below, supplemented with a relevant set of Military Standards, Airworthiness codes for civil aircraft and other publications used in the certification process.

The Reference Database will be kept up-to-date and can be expanded with other standards if required by the customer.

CMA workspace
Using the View buttons five different tree views for showing/ selecting requirements can be chosen.

Each View shows the requirements in a different order:
• Certification Base: by Certification Base with underlying Criteria
• Standard Documents: by Certification Specifications Documents with underlying Criteria
• Compliance Documents: by Compliance Documents in the Data Requirements List (DRL)
• ITBQ: by Item To Be Qualified (ITBQ)
• Requirement Status: by Compliance and Verification status of requirements

The first two tree views show a fully populated tree with underlying Criteria. The other views are initially empty. They will become populated in the course of the process.

Output
The output of the CMA consists of reports that define requirement applicability and the means of compliance and show the progress status of the certification process. These reports provide essential information about the certification process and may become very well part of a Certification Plan or Certification Report. Status reports are generated to support project progress meetings.
Support

CMA is a tool that supports your certification process. In order for the CMA to be most effective in your specific organization and your certification activities, NLR can optionally provide various types of support.

Certification Support
First and foremost, CMA can be deployed most effectively with proper knowledge of the certification process itself. For customers that yet have limited or no experience with certification, or customers that start certification of a new types of platforms (military, civil, rotorcraft, fixed-wing, RPAS) NLR can provide support to get you up to speed. The following types of support have been provided to other customers:

- A five-day training course on certification, tailored to your case;
- Advice on how to organize the certification processes in your company;
- Support in the actual certification activities for certain platforms:
  - Definition of a certification plan;
  - Assist or perform compliance demonstration activities;
  - Performing Aircraft System Safety Assessments (Mil-Std-882 or ARP4761);
  - Provide Compliance Verification Engineers – NLR is an EASA service provider;
  - Compliance documentation and Certification Report.

CMA Software Support
NLR can provide optional support to the CMA tool, in order to keep it up date and relevant for your organisation. The following support is available:

- Implementation Support;
  - Provide product training specifically on the use of CMA and how to embed it in your operational processes. This can be combined with the certification training mentioned above.
- Tailoring:
  - Porting to other computer platforms and operating systems;
  - Implementing additional functionality;
  - Implementing customer specific report formats and layout.
- Support software license.
  - Expanding and updating the Reference Document Database with new documents on customer request.
  - Bug fixes and updates

NLR and Certification
NLR is the largest aerospace R&D center of the Netherlands. Our mission is to provide support to governments, industry and users in the aerospace domain, and developing and maintaining new knowledge and facilities to stay ahead of the game. NLR activities cover the full product and operational life-cycle of civil and military platforms, both manned and unmanned. This comprises:

- The design, ground testing and flight testing of aerospace vehicles and systems, including ground facilities and instrumentation;
- Human factors, training, safety, environmental impact and airspace & capacity.

NLR has decades of experience in certification and certification support for its own test aircraft and aircraft of our civil and military customers. The CMA tool has been developed firstly out of a real need to support our own activities for our own aircraft and for one of our prime customers.

NLR holds the following certifications and qualifications:

- EASA Qualified Entity for multiple subjects;
- Part 145 Maintenance and Modification approval for our own aircraft;
- Part M Continuous Airworthiness approval for our own aircraft;
- Part 21 DOA for our own aircraft;

More information about our capabilities, experience and testing facilities can be provided on request.

Please contact us for more information – cma@nlr.nl