



LDRA

Certification Services

The Comprehensive and
Fully Compliant
Certification Solution

LDRA Certification Services (LCS) offers the first comprehensive and fully compliant FAA/EASA certification solution. A division of LDRA Technology, Inc., the leading provider of safety-critical software verification tools and software best practices for the past 40 years, LCS has assembled a team of certification industry experts who are credentialed across all aviation disciplines. LCS is also aligned with Development & Verification specialists who use the *LDRA tool suite*[®] and other complementary tools to ready products for certification.

LCS provides comprehensive support for a definitive set of aviation standards, encompassing the following aviation disciplines:

- Aircraft & Systems Development (ARP4754A)
- Safety Assessment (ARP4761)
- Environmental Testing (DO-160)
- Integrated Modular Avionics (DO-297)
- Flight Electronic Hardware (DO-254)
- Flight Software (DO-178B/C)
- Ground Systems (DO-278/A)

In each of these varied disciplines the LCS comprehensive solution gives the highest possible level of confidence in the accuracy and completeness of the decision process, consequently minimising risk and associated cost. LCS analyses certification and safety needs from a total aircraft system perspective while assuring that the individual and exacting aviation standards are met.

Proficient in both commercial and military airworthiness regimes, only LCS can address all critical project requirements as they relate to certification, including management and planning, staff training, development, verification and production. LCS is also unique in offering *fixed price solutions* for even the most challenging certification opportunities.

The LCS certification proficiencies and associated tools extend into other safety - critical markets such as industrial control, automotive, medical device, nuclear power and transportation systems. Please contact a LCS representative for additional information.





Todd R. White, FAA DER

The renowned LCS Team is lead by Todd R. White. Todd is a Systems and Equipment FAA DER with Level A authority on all aircraft systems and equipment for both Software and Airborne Electronic Hardware. As a DER and certification consultant, Todd has worked with the largest and best-known suppliers of avionics. He was an Executive Committee Member of the DO-178C / DO-278A Committee and is currently an Executive Committee Member on the Forum on Aeronautical Software recently formed to oversee the application of DO-178C document suite. Todd is also an Executive Committee Member of the NextGen Task Force and holds a leadership role in the U.S. DO-254 Users Group.



Steve Morton, FAA DER

Steve Morton is a consultant FAA Level A Software DER with extensive expertise in the development and use of aerospace software tools. Steve was a member of SC-205, which developed DO-178C, DO-278A, and their technology supplements. Steve substituted as acting co-chair of subgroup 3, which was responsible for the Software Tool Qualification Considerations supplement to DO-178C, and was an Editorial Subcommittee Member for DO-248C. In addition to his consultancy at TBV Associates, Steve was formerly a Software DER at Hawker Beechcraft Corporation, with responsibilities across the spectrum of HBC's Part 23 and Part 25 aircraft line up. Steve has provided training on tool qualification at multiple FAA National Software and Airborne Electronic Hardware Conferences.



Kevin Meier, FAA DER

Kevin Meier, a recognised expert in Systems and Aircraft-Level Certification, is a Software ODA Unit Member and Consultant FAA DER. Kevin has extensive experience related to Environmental and Systems qualification to RTCA DO-160. Kevin was a member of SC-205 and the subgroup that produced DO-331, Model Based Development and Verification; he is currently a member of SC-216, Aeronautical Security committee. Kevin has worked as a consultant at companies such as Cessna Aircraft Company, AlliedSignal Commercial Avionics Systems and Honeywell Air Transport Avionics Division.



Holly Hildreth, Ph.D.

Complementing the LCS FAA DER team is safety expert, Holly Hildreth. Dr. Hildreth is an expert in assisting teams to gain compliance against a wide range of U.S. and international standards including: MIL-STD-882, RTCA DO-178, NASA-STD-8719 and NASA-STD-8739, IEC 61508, IEC 62304 and STANAG 4404/4452. Dr. Hildreth's empirical knowledge of each phase of the software development lifecycle enables her to provide a valuable liaison role between disparate teams, and between corporate teams and government customers.

LCS offers a suite of tools essential to DO-178B/C, DO-278A and DO-254 compliance. These tools facilitate all phases of the DO-178B/C and DO-254 lifecycles, including the definition and publishing of all document deliverables and the production of certification evidence.

The essential elements of a compliance infrastructure are provided by the LDRA Compliance Management System (LCMS). LCMS is widely used by Avionics OEMs, Avionics Suppliers and Military Equipment Suppliers as well as the FAA. LCMS provides a fully compliant infrastructure based on best practices from industry (clients and RTCA Committees), authorities (FAA, EASA, Military) and DERs.

LCMS is perfectly complemented by the *LDRA tool suite* software verification capabilities including static analysis, code coverage and software testing. These capabilities are extended by the *TBreq* Connector for IBM Rational DOORS and Microsoft Word or Excel as well as *Visure Requirements*, a requirements definition and management tool.

In addition to ensuring the functional integration of these tools in a complete lifecycle solution, the LCS Team provides the expertise to ensure their proper utilisation to meet project requirements and DO-178B/C and DO-278A objectives, resulting in a significant reduction in the cost of certification.

LDRA Compliance Management System Services

LCMS provides the development organisation with compliance management capabilities to help support compliance evidence collection and provide visibility to the project team and transparency to the Certification Authority. LCMS includes a definitive set of DO-178B/C, DO-278A and DO-254 templates, associated activity checklists and key compliant process support mechanisms such as problem reporting and action item listing.

LDRA Tool Suite

The *LDRA tool suite* (LDRA) offers a range of qualifiable verification capabilities that can be applied in support of most DO-178B/C objectives (including the management of these objectives themselves). LDRA has established itself as a thought leader in the DO-178B marketplace with a legacy of hundreds of successful client product certifications including structural coverage for Levels A, B & C and the application of coding standards. Compliance evidence compiled by LDRA, organised by DO-178B/C and DO-278A objectives, includes requirements definition, verification, validation and traceability data; data coupling

and control coupling artefacts; design and source code assets; test coverage artefacts, as well as executable object code verification artefacts for Software Level A.

TBreq/TBmanager

TBreq/TBmanager supports the tracing of requirements and other lifecycle data throughout the development lifecycle. Requirements captured from Microsoft Office documents or third party requirements tools such as IBM Rational DOORS can be traced through lower level requirements to the source code itself, as well as to the associated verification activities and artefacts produced by the *LDRA tool suite*.

Visure Requirements

Visure Requirements is a state-of-the-art Requirements Definition and Management (RDM) tool specifically designed to provide integral support to embedded systems development and verification processes. This powerful RDM tool helps teams build systems, high level and low level requirements specifications. *Visure Requirements* also adds graphical functions for supporting the specification organisation and publication for large and complex projects, guaranteeing specification consistency and traceability.

LCS support encompasses the numerous services performed by the LCS Team and aligned development and verification specialists. LCS manages these services to conform with aviation standards and facilitate the information flows depicted in Figure 1. The LCS support services, offered at fixed prices, are categorised as follows:

- FAA Designated Engineering Representative (DER) services
- LDRA tool suite services
- DO-178B/C development and verification services
- DO-254 development and verification services

DER Services

LCS FAA DER Services provide key support to LCS clients across the entire product life cycle. Services include Certification Roadmaps, FAA Compliance Findings and Certification Liaisons (FAA, EASA, TCCA, CAAC). The LCS FAA DER becomes involved with clients at or near project inception, followed by training and then continues involvement providing Stage of Involvement (SOI) audits and more general support. In addition to the training and packaged services identified below, LCS FAA DER consulting days are also available.

Training

LCS Training includes world-class on-site or web-based training for DO-178B/C, DO-278/A, DO-254, DO-297, ARP4754A, ARP4761 and DO-160. LCS courses are created and delivered by Level A FAA DERs and safety specialists. These instructors are internationally recognised experts who have practical experience in the disciplines they teach. LCS Training features hands-on tasks and real-world scenarios. Course outlines, including customised seminars, are available upon request.

Additional training courses offered are:

- System and Software Certification for Executives
- Quick Start with LCMS

Packaged Services

FAA SOI audits are performed by LCS Level A DERs. These audits can be performed for DO-178 / DO-278 software levels A through to D. Significant price reductions are extended to LCMS customers. Gap analyses are also offered for DO-178/DO-278 and DO-254 applicants.



LDRA tool suite Services

Code Coverage and Static Analysis Tool Qualification Support Package

There are two Tool Qualification Support Packs (TQSP) for DO-178B/C offered by LDRA. The Code Coverage TQSP includes *LDRA tool suite* documentation and a Structural Coverage validation test suite. The Static Analysis TQSP includes the *LDRA tool suite* documentation and a coding rules validation test suite. These two TQSPs are also offered as a single or combined TQSP.

Lifecycle Traceability Matrix (LTX) Deployment Service

The LTX Deployment Service is a consultancy dedicated to the deployment of LDRA Compliance Management System (LCMS), *TBreq*®, Visure Requirements and *TBmanager*® at the client facility. A direct link provides a seamless integration between the project activities and

documents of LCMS with the verification artefacts available in *TBmanager*. *TBreq* interfaces between *TBmanager* and requirements repositories such as IBM Rational DOORS, Microsoft Word or Excel in order to ensure traceability across the software lifecycle and verification of the completeness of the requirements coverage. Alternatively, LCS customers can choose Visure Requirements, a requirements definition and management tool that is functionally integrated with *TBmanager*.

Target Licence Package

Target Licence Package (TLP) facilitates target environment testing (simulator or target CPU) and includes remote technical support (email, telephone, web-based) to assist with LDRA tool configuration and set-up. TLPs are cost effectively applied across virtually any C, C++, Ada or Java source code cross- compiler and associated target system.

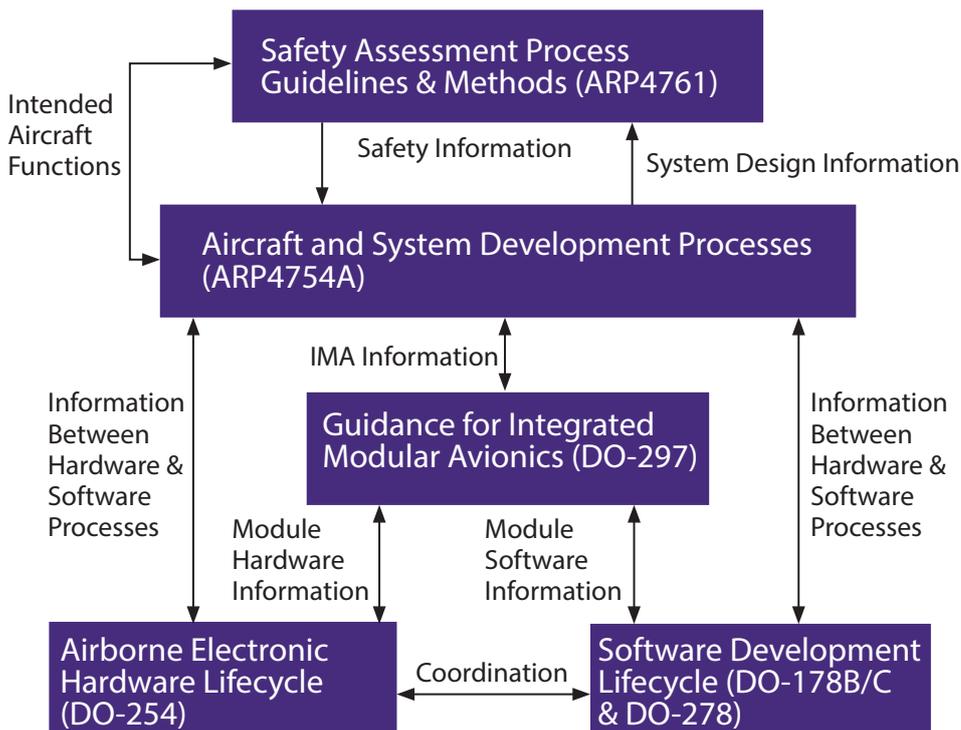


Figure 1: LCS Standards and Information Flow Management

DO-254 Design and Verification Services

Using the foremost DO-254 tools in the industry, LCS offers hardware electronic design at the box/ LRU, board/circuit card, or FPGA level. Designs are compliant to DO-254 Level A through D and all of the artefacts including documentation, records, and data are provided. LCS will also apply any or all of the DO-254 lifecycle in preparation for certification of existing designs, whether complete or prototype. Figure 2 depicts the DO-254 lifecycle which is fully supported by LCS.

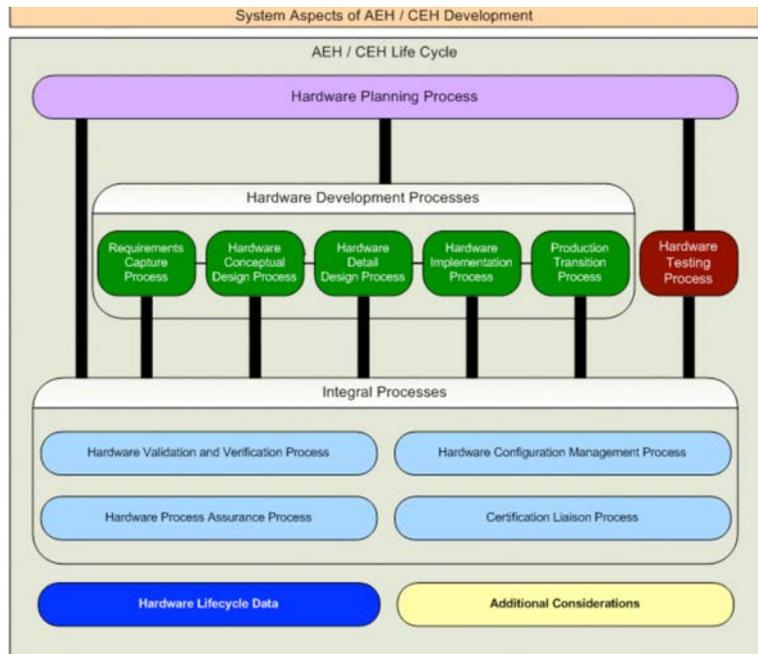


Figure 2: DO-254 Lifecycle

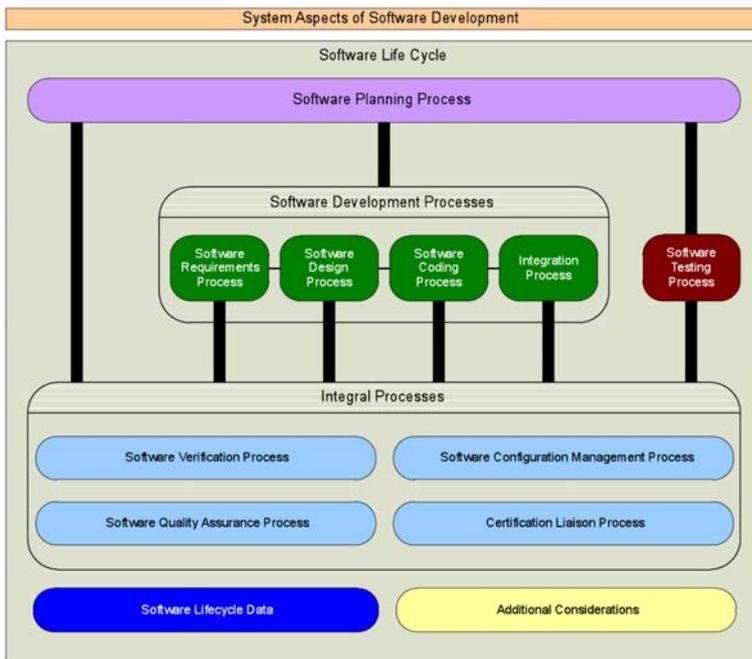


Figure 3: DO-178B Lifecycle

DO-178B/C Design and Verification Services

LCS has more than 40 years' experience in safety critical software design and development.

LCS offers software design for safety critical embedded systems utilising practically any microprocessor or microcontroller. Through the use of the *LDRA tool suite*, LCS also offers verification services compliant with DO-178B/C. These services can be applied to new or existing software designs for any segment of the DO-178B/C lifecycle. All of the artefacts including documentation, records, and data are provided with the DO-178B/C package levels A through to D. Figure 3 depicts the DO-178B lifecycle which is fully supported by LCS.

3 Easy Steps to Get Started:

Step 1: Receive a Free Telephone / WebEx Consultation with Todd R. White, LCS Team Lead.

Step 2: Review your Free Certification Roadmap Prepared by the LCS Team.

Step 3: Implement the Certification Roadmap.

Please contact a LCS representative for additional information.

A selection of LCS clients in the aerospace industry



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