LDRA
Software Technology

Achieving DO-178B Level A with LDRA
"better structured Code without errors" for Penny & Giles

Quality is at the heart of Penny & Gilesproducts. The LDRA tool suite has been chosen to help maintain this tradition in new product development.

Penny & Giles Aerospace Ltd.

Penny & Giles Aerospace of Christchurch, UK,is part of the Curtiss-Wright Group. For over 40years the company has developed, manufactured and delivered a range of avionics products to the world's foremost aircraft manufacturers and operators. These include air data computers, cockpit voice and flight datarecorders, maintenance recorders and ice and snow detectors.In the year 2001 Penny & Giles successfully certified their first product to Level A of the RTCA DO-178B standard required for safetycritical avionics software for use on commercialaircraft. The product, a software configurable air data computer (SCADU), has been certifiedby the Federal Aviation Administration and bythe UK's Civil Aviation Authority.

The Project & Solution

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Penny & Giles selected the **LDRA tool suite** to verify their C source code for their maiden project to be certified to DO-178B Level A, the most rigorous testing standard for avionics software. From the software design the engineers carried out a thorough unit and module test process, utilising **TBrun** for automatic test harness generation, black box functional testing and also white box testing to measure code coverage.

SCADU

To meet the requirements of DO-178B Level A means testing to Modified Condition Decision Coverage – *not an easy task!*

As the software was written purely in C, Penny & Giles decided to adopt a subset of the MISRA C coding guidelines and used the static analysis features of **LDRA Testbed** to automate much of the code checking. This was a great benefit to the team.
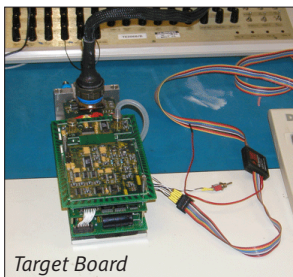
Target Board

"At first adhering to coding guidelines can be hard work but the feedback from the Quality Report in the tool soon takes effect and the engineers start to automatically write better structured code without errors." said Adrian Fountain.
"It has saved us a lot of time in testing and maintenance phases by sorting out these issues early in the lifecycle"
Up to 25 software engineers were involved with development and testing at peak times. Penny & Giles worked successfully with another part of the company in Belfast and used a subcontractor for some of the testing. All parties used the **LDRA tool suite** which was fully integrated into the required host and target test environments.

Benefits

The main benefits Penny & Giles have gained from utilising the **LDRA tool suite** have been thoroughly tested code and the facilities to meet the requirements of DO-178B Level A testing – namely code coverage metrics, documentation and tool qualification. In describing these benefits Adrian Fountain stated - *"With the automation, repeatability and common method enforced, the tools have been easy to use and have fitted easily into our test process."... "LDRA have been responsive to our needs and provided good customer support. The tools are powerful, flexible and configurable to the needs of the project."*

Tool Qualification

LDRA's tools are classified as "software verification tools" under the DO-178B standard and as such are required to be qualified on a project-by-project basis. This means that when assessing the merits of such tools it is essential to consider the level of vendor assistance for tool qualification. As an integral part of the LDRA Testbed DO-178B Analysis Package, LDRA offers assistance with this process and agrees to enable clients and the FAA to audit LDRA and the **LDRA tool suite** for use in your project. This audit process has been undertaken by Penny & Giles as part of their efforts to meet DO-178B.

SCADU Product Technical Information

Used on rotary and fixed wing aircraft for the calculation of air data parameters. It computes avionic data information from the pitot-static pneumatic system and aircraft temperature probe to provide primary flight instrumentation to the pilots and autopilot/flight management system.
This system is sold to avionics and airframe companies such as:
Rockwell Collins, Boeing and Sikorsky.

To find out more about saving money and improving quality of service contact LDRA

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