

## HCC Raises the Bar on Quality and Reliability



### The Client

*As a developer of efficient high-quality software for the medical, transport, industrial and aerospace markets worldwide it is essential for HCC Embedded to hold a reputation for premium and reliable products. Following a vigorous and extensive competitive evaluation, HCC Embedded chose the LDRA tool suite to enforce the MISRA standard and to raise the bar on the software development processes applied to the file systems and TCP/IP products that they develop.*

### The Project

“Companies claim their tools are the best, but seldom have measurable data to prove it,” asserts HCC Embedded CEO Dave Hughes. “We wanted to prove our superior quality. The LDRA tool suite gives us this with its comprehensive static analysis and very good dynamic analysis capabilities.”

### The Requirements

HCC Embedded’s adopted the LDRA tool suite as a key element of a wider move to implement more rigorous, verifiable method. “LDRA’s tools helped us adopt a more disciplined process. We needed a standards checker that systematically enforced good programming methods.”

- By adopting MISRA, HCC Embedded can guarantee that they are implementing the most complete, rigorous implementation of C. “The MISRA standard is a very strict subset of C and likely the best reference for creating something that is verifiable,” Hughes affirms. “The LDRA tool suite is the best tool we found in terms of its thoroughness and complete ability to enforce the MISRA standard.”

- In critical systems, MISRA-C:2004 stresses 141 rules in 21 categories. HCC Embedded was able to adopt them all so that the code that was developed was as clean as possible.

### The Benefits

“The truth of the matter is that the LDRA tool suite brings a lot more to the table than other MISRA compliant solutions,” Hughes explains. “The LDRA tool suite is by far the best implementation we have found.”

*“The truth of the matter is that LDRA tool suite is just a lot more thorough than other MISRA compliant solutions.”*

HCC Embedded used the LDRA tool suite to develop its new MISRA compliant TCP/IP stack for embedded applications requiring a high degree of integrity. The engineers designed the code following the MISRA guidelines, and ran the code through the LDRA tool suite’s static analysis engine to ensure full compliance with MISRA-C:2004. “The LDRA tool suite verifies and reports code conformance,” Hughes says. “Our code is well structured and easy to read because of MISRA and because the LDRA tools verify that the standard is correctly implemented.”

Impressed with the difference in quality that the LDRA tool suite delivered, HCC Embedded has committed to making the most stringent programming standards their norm for all key products with full MISRA compliance tested and proven with the LDRA tool suite. To HCC, such rigorous high quality sets their tools apart



MISRA-compliant TCP/IP stack

and establishes a measurable level of quality that does not currently exist in the industry.

“By using the LDRA tool suite to implement MISRA-C:2004, we are convinced HCC’s tools are built on a verifiably, higher quality of code,” Hughes continues. “We gain clean, clear, robust code, with no ambiguities. Our tools are appropriate for use in the most critical embedded applications.”

### The Future

Thanks to the increased quality and reliability, HCC Embedded looks forward to implementing MISRA compliance across its entire product line.

Should compliance to other standards such as CERT-C—a security-oriented standard—become important to customers, HCC Embedded will integrate those too. “We’re committed to deliver high-quality software tools that provide proof of any claims we make. The MISRA standard enforced by the LDRA tool suite raises the bar on quality and reliability for our customers and the industry.”

*Contact LDRA and discover how you too can harness the power of the LDRA tool suite and develop better, more reliable software.*

*“We chose the LDRA tool suite because it covers comprehensive static analysis and has very good dynamic analysis capabilities”*

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**LDRA PARTNERS WITH MATHWORKS**

# Joining Forces to Ease Compliance

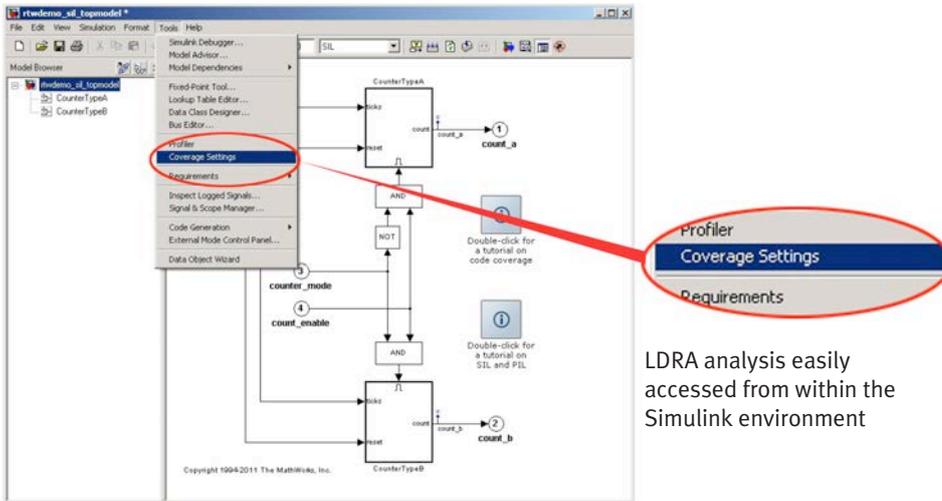
LDRA and MathWorks have integrated the LDRA tool suite with Simulink modeling tools. The integration offers independent verification and full traceability of all artifacts - requirements, model elements, code, and tests - throughout all phases of the software engineering lifecycle, minimising the time and cost of achieving standard compliance.

**MathWorks is the leading developer of mathematical computing software with over 1 Million users worldwide and a pioneer in the area of automatic code generation.**

Key tools for use within the embedded market include: MathWorks MATLAB®, Simulink®, and Embedded Coder toolset.

**MathWorks Capabilities**

- Model-Based Design allows you to develop multi-domain dynamic models of your system.
- Models can be used as an executable specification and efficient C and C++ code can be automatically generated from it.
- Many safety critical systems that we all depend on are running code generated by Simulink Coder.



LDRA analysis easily accessed from within the Simulink environment

**Integration**

The LDRA tool suite® is now integrated with MathWorks MATLAB®, Simulink® and Embedded Coder toolset. This assists users developing, coding, and testing embedded applications using Model-Based Design (MBD) for DO-178B and other safety standards.

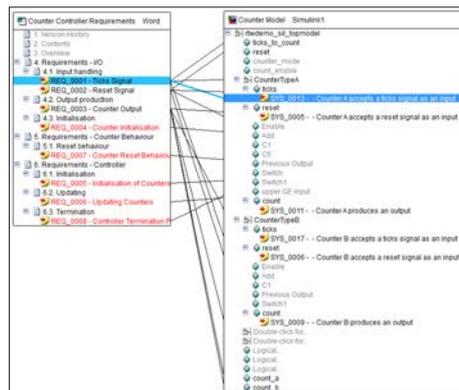
**Why Integrate the Products?**

While MBD speeds application development, industry standards are clarifying their need for independent verification of the model-generated code. The LDRA-MathWorks integration enables Simulink developers to access all the power and capabilities of the LDRA tool suite directly from within Simulink.

Engineers using Simulink to develop high-integrity applications, including those requiring certification to emerging safety standards, DO-178C and ISO 26262, seek to reuse simulation test cases for embedded object code (EOC)

verification. They also want to measure code coverage and identify potential gaps with model coverage obtained using the Simulink Verification and Validation™ model coverage tool.

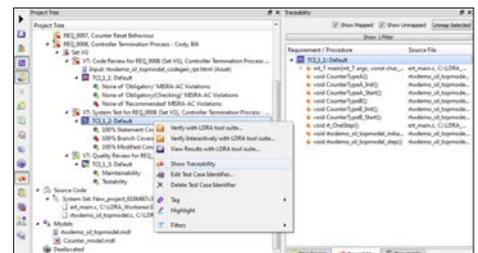
This integration enables verification and validation engineers to prove that the functionality of the executable code not only meets the design criteria, but that the underlying code is also sufficiently exercised in terms of the safety standard they are required to meet.



**Capabilities**

The LDRA Simulink plugin for TBreq allows you to add traceability links between requirements and code generated from Simulink;

- LDRA Testbed can gather dynamic coverage analysis while Simulink runs the model;
- TBmanager allows for managing Simulink models as an integrated part of test planning and verification;



- TBrun can be used with Simulink generated code to create test cases and gather code coverage analysis at the unit level.

### What Can Integration Do?

The integration provides an environment in which Simulink generated and hand-written source code may be seamlessly analysed and instrumented for standards compliance and coverage analysis by the LDRA tool suite. The full coverage reporting capabilities of the tool suite include Statement, Branch / Decision and Modified Condition Decision Coverage (MC/DC).

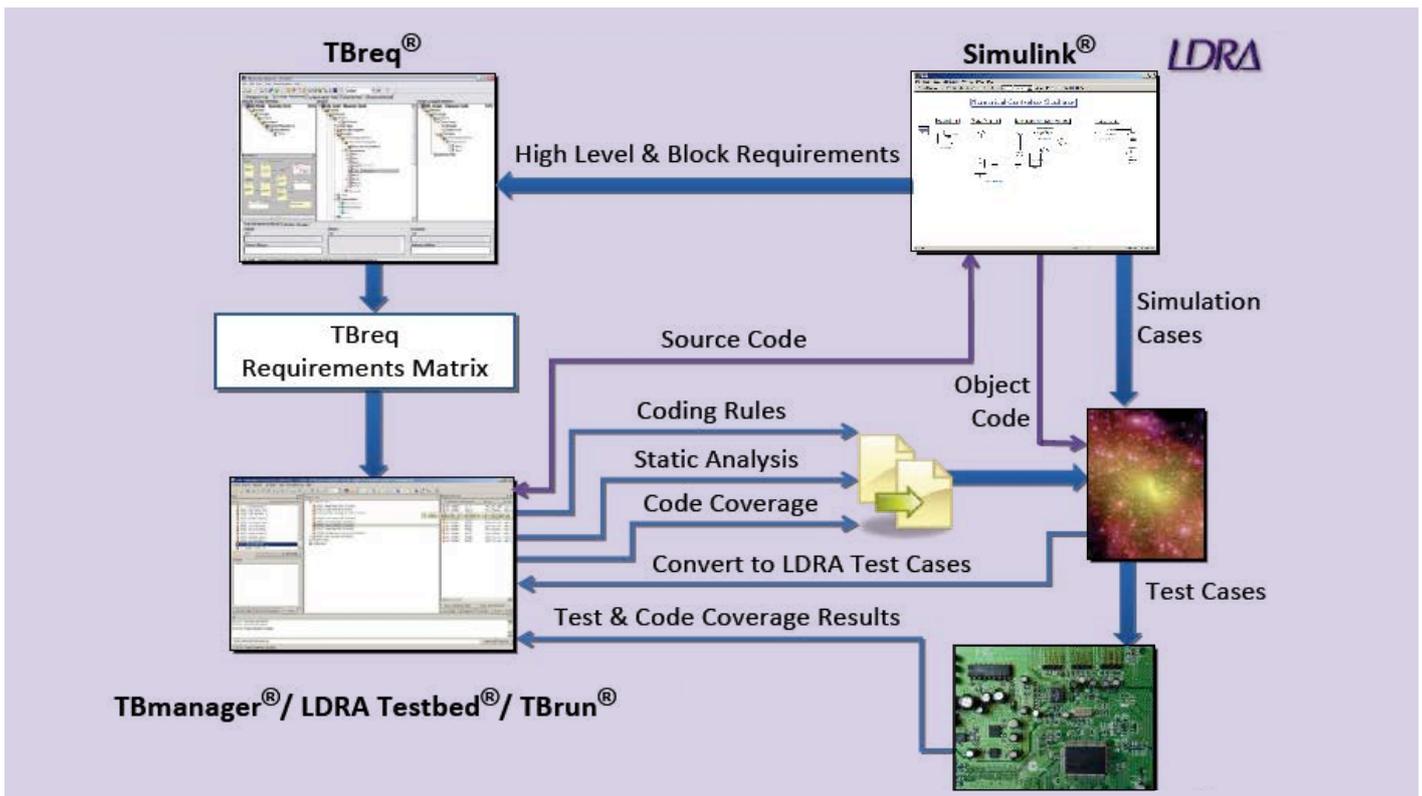
In addition, data values used to exercise the model in simulated environments can be leveraged to test the generated code for SIL (software-in-the-loop) and PIL (processor-in-the-loop) on the target. These model-based tests may then be augmented with the generation of additional tests through LDRA's unit test facility. Output, presented in textual and graphical forms, indicates coverage both as absolute values and in relation to a set of limits that may be required by a standard, such as DO-178B.

### TWO SIDES TO THE STORY



“Model-driven development generates consistent code and saves tremendous development time, helping system integrators reduce costs,” confirmed Ian Hennell, LDRA Operations Director. “LDRA’s experience with the certification process enables developers to achieve even greater savings, by ensuring that the entire application model and hand generated code are verified within one solution that tailors the project requirements, processes and application artifacts according to the guidelines of DO-178B/C, IEC 62304, ISO 26262, IEC 61508 or whatever industry standard must be achieved.”

“Many industries - whether aerospace, automotive, medical or financial are facing the twin challenges of undergoing rigorous design and software testing while managing projects in allocated time and budgets,” Tom Erkkinen, Embedded Applications Manager, MathWorks. “Because of this, companies are looking to embrace new ways to verify that the products they develop are robust, maintainable and secure. This MathWorks - LDRA integration allows developers to gain the benefits of MBD and quickly assess if the generated code has been exercised using well-established coverage metrics, ultimately improving a company’s product quality and bottom line.



## Tool Integration News



### QNX® Momentics® Tool Suite and QNX® Neutrino® Realtime Operating System

The LDRA tool suite now supports QNX Software System Limited's QNX® Momentics® Tool Suite and QNX® Neutrino® Realtime Operating System (RTOS). The LDRA tool suite utilises network communications to download the executable to the target, and to facilitate the export of execution history and unit test data. The integration supports both C and C++.

The utility applications to exchange files between the host and target have been updated to support the requirements of Neutrino v6.5.0. When used in conjunction with the latest enhancements to the LDRA Eclipse plug-ins, this provides options to either use the LDRA GUI interfaces as with earlier QNX versions, or to use a version integrated with QNX Momentics.

### **TASKING™** TASKING VX-toolset for Infineon's C166

The LDRA tool suite's integration with the TASKING VX-toolset for Infineon's C166 brings certifiability to this small footprint family and its derivatives. LDRA stands alone in providing standard compliance across all stages of the lifecycle whether for automotive with MISRA and ISO 26262, industrial with IEC 61508 or avionics/military with DO-178B.



### Code Warrior for HCo8/HCS08

Targeting avionics, medical and automotive applications, LDRA integrated the LDRA tool suite with Code Warrior for HCo8/HCS08, bringing powerful certification capabilities to this 8-bit footprint.

## LDRA Services

Through our highly skilled engineers, LDRA and our partners are able to offer a wide range of services.

#### These include:

- Implementation of techniques for the achievement of software quality objectives
- Testing
- Validation and verification of software
- Setting up software quality systems and services
- Providing key experts to support in-house quality systems

LDRA experts also undertake software and computer system assessments, which target issues such as portability, maintainability and reliability and process improvement.

#### Contact:

Ian Smith  
LDRA Services Manager  
ian.smith@ldra.com

## LDRA Newsroom

### LDRA Webinars

LDRA have created a web seminar series to help current and future customers learn more about the LDRA tool suite and how it can assist in developing software quality and security through test, analysis and requirements traceability. These web seminars can be viewed at [www.ldra.com/webinars.asp](http://www.ldra.com/webinars.asp).

### Events

LDRA will be participating in a number of trade events throughout the year. Come and talk to us. Existing customers are always welcome. Potential customers - find out how, by working together, we can substantially improve software safety and efficiency and achieve financial benefits.

For more information contact:  
[www.ldra.com/events.asp](http://www.ldra.com/events.asp)



### LDRA Training

To obtain more information or book on-site or public training courses contact LDRA on:  
[info@ldra.com](mailto:info@ldra.com)



t: +44 (0)151 649 9300  
e: [info@ldra.com](mailto:info@ldra.com)  
w: [www.ldra.com](http://www.ldra.com)

#### Newsletter Contributions

Contributions from our readers are welcome. If you have any comments or stories that you feel are relevant to the world of software testing please contact us.