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Safety through quality

CASE STUDY

RapiCover

RapiCover's advanced features accelerate the certification of military UAV Engine Control

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Case study: Rapi**Cover**

"Rapi**Cover**'s low overheads and advanced features enabled our team to significantly reduce the time and effort required for our structural coverage analysis"

MBE Systems™ are leaders in the design, development and manufacture of integrated engine management and powertrain control systems for the world's automotive, aviation and marine industries. MBE are based in Gloucestershire in the UK and their specialist teams of electronic, software and control engineers have been providing expert solutions since 1987.

MBE were awarded the contract to develop a Full Authority Digital Engine Control (FADEC) system for a US Department of Defence (DoD) funded Unmanned Aerial Vehicle (UAV) System. Structural coverage analysis was a key part of the verification workflow that MBE needed to perform to ensure that the software was robust and thoroughly tested.

RapiCover

By selecting Rapi**Cover**, MBE chose a solution that is proven for the highest-criticality aerospace projects and had the advanced features they needed to integrate into their verification processes.

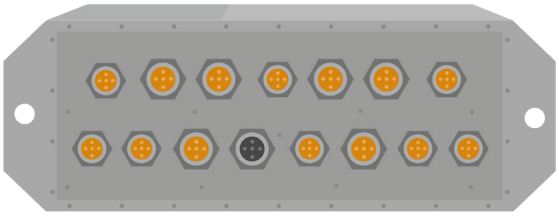

Figure 1 – Illustration of a FADEC system

The Challenge

MBE needed to collect structural coverage metrics on the final target hardware that was to be used in the UAV platform. This hardware had limited RAM and a primary requirement stipulated that only 50% of this RAM was to be used by the FADEC system under test. MBE would need a lightweight tool that would use as little RAM as possible to store and return coverage data during test execution.

MBE also needed to capture structural coverage metrics from a range of different software builds and needed an efficient way to combine results from multiple test runs into a single, unified coverage report.

Summary

The challenge

- Collection of structural coverage metrics for a military UAV FADEC system
- 50% max usage requirement on a target with constrained RAM

The solution

- Integration of the Rapi**Cover** tool for structural coverage analysis
- Deployment of a highly efficient data collection strategy for a codebase written in C

The benefits

- Rapi**Cover**'s low on-target overheads allowed MBE Systems to reduce the number of builds needed to collect coverage results
- Advanced structural coverage analysis features streamlined MBE's verification workflow
- Responsive and efficient customer support

The MBE team work collaboratively and needed to export coverage results in a convenient, easily-readable way that could be shared across the team efficiently.

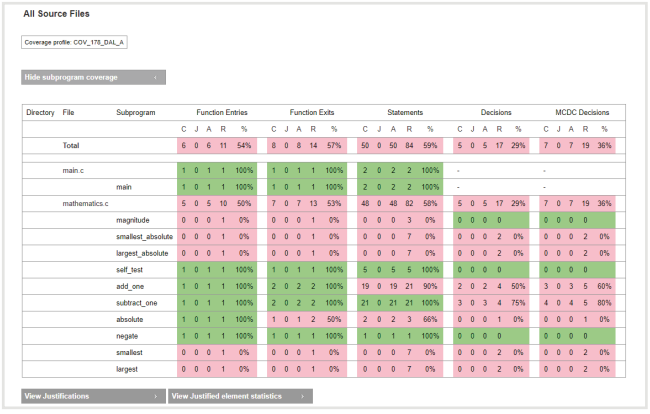

Figure 2 – Example Rapi**Cover** HTML export

The Solution

Rapita delivered an integration of Rapi**Cover**, a structural coverage solution that has a long track record of successful deployments in high-criticality aerospace projects. Rapi**Cover** features the lowest overheads available on the market and was able to support the limited RAM allocation available on MBE's target hardware.

Rapi**Cover**'s comprehensive in-built tutorials enabled MBE engineers to learn how to effectively use advanced Rapi**Cover** functionality to support their verification workflow, such as merging multiple reports, creating "justifications" for unreachable code, and exporting coverage reports to support collaboration. When MBE did need additional support, Rapita's best-in-class support service was there to provide high-quality, timely support.

Thanks in part to their successful use of Rapi**Cover**, MBE successfully passed their SOI#4 audit.

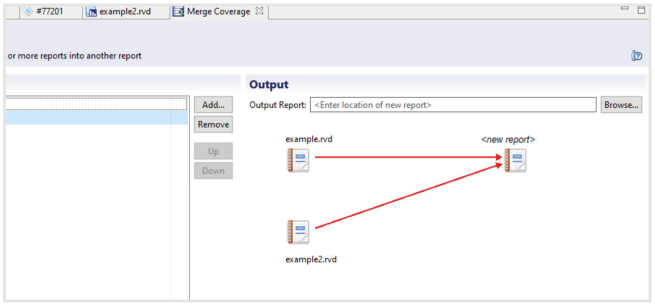

Figure 3 – Merge coverage feature

The Benefits

- Rapi**Cover**'s extremely low on-target overheads reduced the number of builds needed to produce coverage results and made it simple to work with MBE's RAM-constrained target
- MBE were able to efficiently merge multiple coverage maps into a unified, complete report, making the collection of results simpler, with less manual steps in the workflow
- Rapi**Cover**'s justifications feature made it easy to mark unreachable code (for example defensive code) as covered by manual review; automatic migration of justifications when code changes also improved analysis efficiency

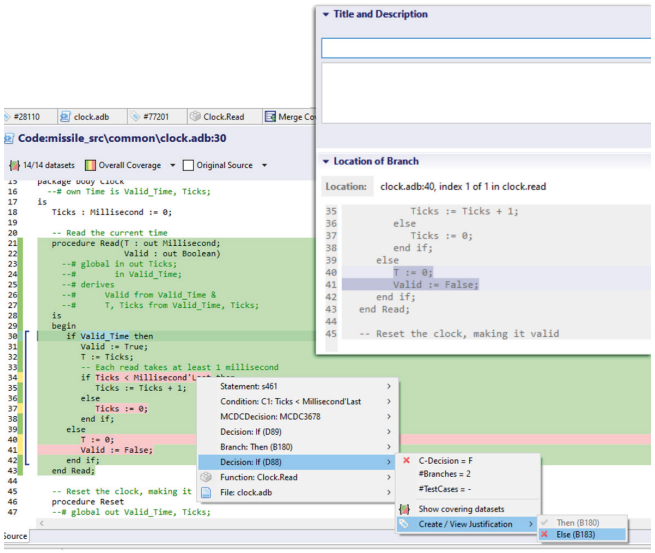

Figure 4 – MBE were able to add coverage gap justifications straight from their source code (generic example shown)

- HTML exports of coverage reports made it easy for MBE's engineers to share coverage data and work efficiently as a team
- Best-in-class support provided timely technical assistance when needed

> "Rapi**Cover**'s low overheads and advanced features enabled our team to significantly reduce the time and effort required for our structural coverage analysis. Rapita's support team also demonstrated a genuine determination to support us when required, and we are delighted with our overall experience with Rapita as a verification partner."
>
> **Steve Baker**
>
> Director
> **MBE Systems**

Next steps

To learn how Rapi**Cover** can help reduce the cost and effort of code coverage analysis, see our product page at www.rapitasystems.com/products/rapicover.

To enquire about what Rapita can do for you, contact us at info@rapitasystems.com.

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About Rapita

Rapita Systems provides on-target software verification tools and services globally to the embedded aerospace and automotive electronics industries.

Our solutions help to increase software quality, deliver evidence to meet safety and certification objectives and reduce costs.

Find out more

A range of free high-quality materials are available at:
rapitasystems.com/downloads

SUPPORTING CUSTOMERS WITH:

Tools	Engineering Services	Multicore verification
Rapita **Verification Suite**:	V&V Services	**MACH**[178]
Rapi**Test**	Integration Services	Multicore Timing Solution
Rapi**Cover**	Qualification	
Rapi**Time**	SW/HW Engineering	
Rapi**Task**	Compiler Verification	

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