Marelli's experience with Solid Sands' Compiler Qualification Service

Valuable support based on competence and collaboration

SERVICE STORY

Marelli is one of the world's leading global independent suppliers of intelligent systems to the automotive sector. The company covers several automotive technology areas, including Powertrain, which deals with the whole vehicle's propulsion system for internal combustion engine systems. For Luca Barbina, Software Tools & Methodology Specialist in Marelli's Powertrain Division, ensuring toolchain compliance with safety standards such as ISO 26262 is an important part of his remit. When it came to qualifying the commercial C compiler in the division's toolchain, he decided to use Solid Sands' Compiler Qualification Service. We asked Luca about the process and how well it had gone.

What prompted you to use Solid Sands' Compiler Qualification Service?

"We initiated the collaboration with Solid Sands to have a compiler qualification that complies with the latest regulations, especially ISO 26262 up to ASIL (Automotive Safety Integrity Level) D. In the past, our toolchain certification was based on proof-of-use of the compiler, but to meet the more stringent requirements we decided the ideal choice was to use an independent, third-party, specialized compiler qualification service."

How easy was it to provide Solid Sands with the information needed to duplicate your software development environment?

"Very easy. We simply provided Solid Sands with an account on our development system that gave them a direct connection to the target evaluation board. It saved having to send the evaluation board and the associated tools to Solid Sands, which saved a lot of time and effort."

How long did it take Solid Sands to qualify the compiler and how comprehensive was their report?

"Around two months in total, but we received a first draft of the report before the final one so we could start to evaluate it. The final report was very comprehensive and also very technical, so it required the technical details to be understood. Solid Sands collaborated on that, talking with us at least once a week to help us understand exactly what the report meant by eliminating any doubt or misunderstanding. As a second step, they also helped us to revise our internal compiler safety manual based on their findings."

What did you learn about the compiler that you didn't already know?

"We learned a lot, especially about a number of subtle and rare use cases that can affect the behavior of a compiler. Although there were some cases we have never seen in production, we were able to make our code even more robust to ensure we would not fall into them. As a result, we were able to improve our build process."

How easy was it to develop workarounds or avoid certain use cases?

"In some cases, Solid Sands advised us that the use of a specific compiler option was not recommended in specific situations, so that we could avoid it or work with Solid Sands to apply the necessary mitigation actions. There was also strong collaboration when developing workarounds or checks to identify potential issues. As a result, we were quickly able to develop a procedure to locate all the relevant cases."

When you look back on the whole experience, how well did it go?

"It has been a win-win situation. We learned a lot about the compiler, and we learned a lot about compiler qualification, which although it's not our specific area of expertise, is something we needed. We were also able to write an internal safety manual to use the compiler within three months – two months for Solid Sands' compiler qualification and report, and one month to find all the workarounds, determine how to find the relevant topics in the code, and revise our internal safety manual."

Did you consider using companies other than Solid Sands?

"We chose Solid Sands after screening a number of companies, and that choice has been vindicated by the fact that Solid Sands proved to be highly competent in finding possible issues in the compiler. It was also a highly collaborative relationship, which meant we not only received a technical report, we also learned how to better use the compiler. We are very happy with Solid Sands and will continue to use their services."

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Solid Sands

Solid Sands is the leading provider of compiler and library testing and qualification technology in North America, Europe and Asia. Our mission is to put quality into C. We do that by improving the quality of C and C++ compilers, libraries and analysis tools, and by enabling their safe and secure use. With the quality level of our test suites, we stay at the forefront of software testing and qualification to help you achieve ISO compliance and functional safety standard requirements.

Founded in 2014, Solid Sands is headquartered in Amsterdam, The Netherlands. With partners all over the world we serve both leading innovative companies in the semiconductor, IP and security industries aswell as safety-critical companies in automotive, robotics, railway and medical.

Our SuperTest Compiler Test and Validation Suite provides a complete validation environment which enables customers to achieve the software quality level demanded by the ISO language and functional safety standards. Meanwhile, our SuperGuard C Library Safety Qualification Suite is a requirements-based test suite for the C standard library with full traceability between the requirements derived from the ISO C language definition and the individual library tests.

SOLID SANDS
from Amsterdam is the one-stop shop for
C and C++ compiler and library testing,
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