# SuperTest – helping eSOL deliver safety-compliant real-time embedded software platforms

Virtually all of today's safety-critical embedded software applications are made up of three components – developer written application code, standard library components, and a real-time operating system (RTOS). For Rolland Dudemaine, Vice President Engineering at eSOL Europe, that last element is why compliance to safety standards, such as ISO 26262 for automotive, is so important. One of his responsibilities is to ensure that the real-time operating system releases, developed and supported by his team, are exhaustively tested for robustness and compliance. That's why eSOL chose SuperTest to do a crucial part of this job. With multi-core processors for automotive and other safety-critical applications currently sporting tens or hundreds of cores on a single chip, verifying operating system compliance is a critical part of the company's development effort.

"Multi-core processing is a trend we identified a long time ago. We created an operating system called eMCOS®, designed to run on systems with up to 256 cores and sometimes even more, which we currently provide to customers mostly in the automotive market," says Rolland Dudemaine. "We also have a team supporting our Autoware, AUTOSAR Classic Platform and AUTOSAR Adaptive Platform offerings."

Being able to offer safety-certified operating systems and platforms based on eMCOS® or AUTOSAR means eSOL needs to provide a fully-tested standard programming API, which is where SuperTest fits in perfectly.

"Everyone expects the operating system to be shipped with the C library, and sometimes the C++ library, so we need to make sure that the functionality of these libraries is fully tested in accordance with the latest Functional Safety (FuSa) methodology. For us, the use of SuperTest is essential, because even though we use the ARM platform and a functional safety qualified commercial ARM compiler with a set of pre-qualified C and C++ libraries, they don't provide all the pieces we need. For example, things like *malloc*, parts of the C library and POSIX library that are operating system dependent, and some additional headers that are related to our operating system APIs. It's not that ARM has failed to include these things, it's because they are operating system dependent, so the ARM tool chain assumes that the operating system or platform vendor will implement the remaining pieces."

eSOL's eMCOS® development team now runs SuperTest on each new release of eSOL's operating systems to verify that the many operating system APIs that SuperTest covers are functioning as expected.

"We use SuperTest as a functional test suite, a coverage test suite, and a compliance test suite, because our customers expect eSOL to provide an operating system that is already fully tested and compliant," says Rolland. "SuperTest also has the advantage that several of our customers and partners are already familiar with it and will often use SuperTest themselves for verifying compliance. The fact that we have pre-tested our operating systems and libraries with SuperTest gives them added confidence."

"The two big values of SuperTest are firstly the test suite's capability itself, and secondly that its existing tests having already been developed and well documented. The addition of new tests to meet our specific requirements was not really difficult," says Rolland. "SuperTest including the C++ library tests do part of it, and we have added other tests that cover specific aspects of our operating systems."

A far as installation was concerned, getting SuperTest up and running was straightforward.

"Our initial installation of SuperTest was painless and the code is clean, which meant we were quickly able to get the tool online. And the support we received via Solid Sands' Japanese distributor was of high quality and reactive," says Rolland. "We don't simply see Solid Sands as a supplier, we also see them as a partner, because we recognize that SuperTest will also be used by many of our customers."

Founded in 1975 and listed on the First Section of the Tokyo Stock Exchange (TSE: 4420), eSOL is a leading global company in the fields of embedded systems and edge computing that seeks to contribute to a safer and better-connected society. eSOL's high-performance and scalable software platform products and first-class professional services, centered around its unique and patented eMCOS® multikernel real-time operating system (RTOS) technology, are used worldwide in demanding embedded application fields which conform to stringent quality, safety and security standards. This includes automotive systems as well as industrial equipment, satellites, medical and digital consumer electronics. In addition to the research and development of its leading-edge products, and joint research with major manufacturers and universities, eSOL is actively engaged in AUTOSAR, Autoware* and multi/many-core technology standardization activities.

For more information on eSOL's safety-compliant real-time embedded software platforms, visit www.esol.com

*Autoware is an open source software built on ROS/ROS 2 for autonomous driving.

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 as well 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.

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