Ansys

CASE STUDY /

Ansys + Volkswagen

"In any case, we were quite happy just because it didn't take us longer in the first project with SCADE. This is worth a lot for the first project after a switch, and many things have become faster. The improvements in our largest unit, which is responsible for diagnosing the battery management system (BMS), have been dramatic. Overall, we have become significantly faster in terms of testing — not only in terms of pure testing, but also in coverage analyses due to the elimination of code analysis functionality."

Dr. Daniel Kirschner
Technical Lead, Methods & Tools / Volkswagen Group Components BMS Development

CASE STUDY

Battery Management System Software Testing Improvements

Embedded-software criticality levels have increased from ISO 26262 Automotive Safety Integrity Level (ASIL) B to ASIL C and D due to the high-power batteries used in next-generation electric cars. This puts strong constraints on the automotive software development process to ensure reliability.

Company Description

The Volkswagen Group Component Battery Management System (BMS) department handles the development of BMS for Volkswagen, but also other brands from the group.

Challenges

Battery management components are one of the critical features in electric cars. The safety and quality considerations are heavily relying on the availability and performances of the software embedded in the battery management system. To achieve this challenge of implementing an efficient safe BMS in the shortest possible time and lowest possible cost, an efficient software development process is key with a straightforward verification path that reduces or even removes activities while preserving or even reinforcing confidence in the final software.

Ansys Products Used

- Ansys SCADE Suite
- Ansys SCADE Test

Engineering Solution

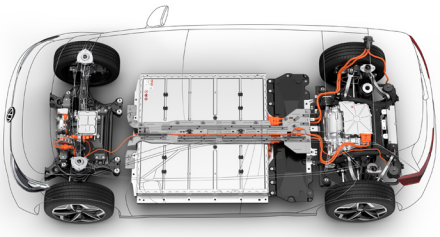
To tackle the challenge, a twofold solution was set up. Ansys SCADE Suite was used to develop the BMS functional design and automatically generate code. Some functions are fully developed in SCADE; others partially. The SCADE language contains strongly defined semantics that avoid any ambiguities and is perfectly suited for such critical software specification. The qualified code generator ensures high-quality code that is directly embeddable without the need to verify that it correctly represents the model. This saves time in verification and gets rid of dedicated tools for such tasks.

SCADE Test is used for software validation and modeling structural coverage assessments. it allows for working at model level and for developing requirement-based test scenarios. Once the model structural coverage is 100% complete, SCADE guarantees that the code is also fully covered using the very same tests, which also reduces verification activities. Ansys and Volkswagen are working together to further improve the capabilities of the SCADE framework towards continuous integration and testing.

Benefits

Using SCADE Suite dramatically enhances the design phase by helping to develop better designs with its dedicated formalism for critical applications. It reduces code verification efforts, thanks to its ISO 26262-qualified code generator up to ASIL D. With SCADE Test, also qualified for ISO 26262, one can prove which functions are used, thanks to model coverage. Virtually all code coverage can be achieved while working at model level only. Using SCADE Test is more efficient compared to Volkswagen's previous model-based approach and allows a significant improvement in archiving full test depth.

The code produced using SCADE is deployed on Volkswagen ID.3 and ID.4 electric cars. SCADE is used in more than 20 different projects. Volkswagen Group Components BMS development is working towards a 100% SCADE-based design.



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