Production-Proven International and ISO 26262 Qualified Success

Today’s automotive systems and software developers must rapidly create flexible, agile, safe and maintainable systems and applications that meet stringent certification requirements while reducing program risks and costs. To efficiently achieve these objectives, ANSYS provides production-proven tools that integrate in existing development flow.

By using SCADE, SUBARU engineers completed a large and very complex application while significantly reducing software development and testing time.”

Masaru KURIHARA
Deputy General Manager, Electronics Engineering Department, FUJI HEAVY INDUSTRIES Ltd.

Embedded Systems and Software Challenges in Automotive

- Manage Requirements & Traceability
- Manage Functional and Architectural Design
- Produce Interface Control Documents (ICDs)
- Comply with the AUTOSAR standard

Reduce Embedded Software Costs
- Reduce costs of producing Embedded Code
- Reduce costs of testing Embedded Code
- Reduce costs of certifying safety-critical applications under ISO 26262

Optimize Overall System Performance
- Enable Virtual Prototyping of complete systems
- Optimize systems performance
- Eliminate late stage integration failures
- Reduce physical and hardware-in-the loop testing

ANSYS Systems & Embedded Automotive Applications

Hybrid & Electric Vehicles
- Embedded Control Software (AUTOSAR OS compliant)
- Simulation Solutions for HEV
- Inverters & Drives
- Battery/Energy Management
- High-Voltage Distribution
- Regenerative Braking

High Safety Systems
- Advanced driver assistance systems (ADAS)
- Autonomous vehicles
- Safety Critical Software requiring ISO 26262 Qualification

In-Vehicles HMIs
- Automotive Dashboards
- Instrument Panels
- In-Vehicle Infotainment

Engine & Powertrain
- Fuel Injection
- Valve Actuation

Chassis
- Electromechanical Braking
- Electronic Power Steering

Power Systems and Body Electronics
- Lighting
- Windows & Locks
- Electrical Generation, Conversion, Distribution
- Power Management
The ANSYS Systems & Embedded Software Product Family

ANSYS SCADE® is a formal, comprehensive, industry-proven solution for developing critical systems and software, supporting the entire development workflow, from requirements analysis and design through verification, implementation, and deployment. ANSYS SCADE solutions easily integrate, allowing for development optimization and increased communication among team members.

SCADE System

**Embedded System Design**

SCADE System® empowers users with a systems design environment for use on systems with high dependability requirements, providing full support of industrial systems engineering processes, such as ISO 26262, and automotive architecture standards such as AUTOSAR. This product features functional and architectural system modeling and verification in a SysML-based environment. SCADE System provides a strong foundation to deploy Model-Based Systems Engineering (MBSE) processes and best practices. By using SCADE System in conjunction with ANSYS SCADE®, system and software engineers can work within the same framework.

SCADE Suite

**Control Software Design**

SCADE Suite® empowers users with a model-based development environment for critical embedded software. With native integration of the Scade language and its formal notation, SCADE Suite is the only integrated design environment for critical applications spanning requirements management, model-based design, simulation, verification, qualifiable/certified code generation, and interoperability with other development tools and platforms. SCADE Suite code generators produce C and Ada.

SCADE Test

**Testing Environment**

SCADE Test provides test engineers with a complete testing environment for creating and managing test cases, measuring coverage, managing test results, and automating execution of test cases for SCADE® applications on host and on target. Test creation and maintenance, together with test execution and coverage analysis, are very time-consuming activities. Test engineers using SCADE Test for Verification and Validation (V&V) activities can now benefit from best-in-class technology in both a model-based approach and a cost-effective testing environment, allowing them to significantly reduce testing efforts.

SCADE Display

**HMI Software Design**

SCADE Display® empowers users with a versatile graphics design and development environment for embedded Human Machine Interfaces (HMI). With a native support for the OpenGL® SC (Safety Critical) and ES (Embedded System) standards, SCADE Display represents a new generation of graphics software development tools, spanning prototyping, display design, simulation, verification and validation, and certified code generation supporting several safety standards in a certifiable environment.

SCADE LifeCycle

**System & Software Lifecycle Management**

SCADE LifeCycle® includes modules combining a unique support for application lifecycle management. This product line features requirements traceability management, configuration and change management, automatic documentation generation, and project monitoring.

SCADE LifeCycle enhances the functionalities of SCADE System®, SCADE Suite®, SCADE Display®, and SCADE Test with add-on modules that embed architecture and design activities within your whole Product/Application Lifecycle Management framework.

SIMPLORER

**System Modeling & Simulation**

Simplorer® is a powerful platform for modeling, simulating, and analyzing virtual system prototypes. Simplorer enables product development teams to verify and optimize performance of their software-controlled, multi-domain systems designs. With flexible modeling capabilities and tight integrations with ANSYS solutions for 3-D multiphysics simulation and ANSYS SCADE products for embedded software design, Simplorer provides broad support for assembling system-level physical models and helping product development organizations connect conceptual design, detailed analysis, and system verification.
A Success Story - ANSYS SCADE @ Subaru

SCADE has been used in the following electric vehicle engine controls:

- Vehicle dynamics
- Vehicle energy consumption
- Heating & air conditioning
- Breaking
- Body controls
- Battery load management

Vehicle Functions

ANSYS Systems Solutions tailored for Innovative Automotive Systems

- Hybrid & Electric Vehicles
  - Simulation Solutions for HEV: Simplorer E/E Systems Simulation platform
- Embedded Software Development:
  - SCADE Suite & LifeCycle for automatic code generation of Embedded Controls (AUTOSAR OS compliant)
- High Safety Systems requiring ISO 26262 Certification:
  - (ADAS, Safety Critical Applications)
- New Generation Automotive Dashboards:
  - SCADE Display for automatic code generation of HMI applications for Embedded targets, Android and Apple iOS

A Complete Solution

As a solution provider in the critical systems and software industry, ANSYS offers professional services expertise, providing ANSYS SCADE-usage ramp-up services, including product training, over-the-shoulder support, ANSYS SCADE modeling optimization, methodology guidelines and training videos. Project support services like tool integration, customization and qualification services, and test strategy optimization services are also available, along with process training and certification expertise services.

ISO 26262 Qualified Code Generators

The SCADE Suite and SCADE Display KCG Code Generators have been qualified by TÜV SÜD for the development of automotive applications up to ASIL D, thus guaranteeing that the generated code is a correct implementation of the SCADE Suite and SCADE Display models. In addition to the code generators, the SCADE Test Model Coverage and the SCADE Test Environment for Host can be used, thus providing a unique environment for the efficient development of certified automotive applications.

ANSYS SCADE Delivers Value

- Improves communication among system/software teams, customers, suppliers, and certification authorities
- Improves long-term maintainability of applications
- Ensures documentation quality and accuracy
- Enables early detection of design flaws
- Reduces development and verification costs
- Enables product line development
- Extensive Support of VDA-FAT AK30 VHDL-AMS
- Reduces risk, time, and cost of ISO 26262 Qualification

ANSYS SCADE Solutions Benefits

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<tr>
<th>Product Development Process Improvements</th>
<th>Best Practices for:</th>
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<tr>
<td>50% Development Costs Reduction</td>
<td>Model-Based Systems Engineering</td>
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<td>2X Time-to-Market Speed up</td>
<td>Integrated Multi-physics and Software Simulation</td>
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<td>Embedded Controls Development</td>
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<td>Interactive Displays Development</td>
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ANSYS How To Videos

Engine Functions
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Discover the latest news on our products and technology at
http://www.esterel-technologies.com/products/