ANSYS SCADE® Model-Based Development Solutions for AEROSPACE & DEFENSE
Today’s aerospace and defense systems and software developers must create flexible, maintainable applications while meeting stringent certification and standards requirements. Additionally, they must manage program costs and key relationships. This is a complicated task that requires the correct tools.

ANSYS provides production proven, model-based development solutions for critical systems and software engineers that reduce cost, risk and time to certification. Esterel Technologies’ industry leading products have been qualified by the FAA, EASA, CAAC, Transport Canada, and ANAC for **DO-178B & C up to level A** for over 100 systems on more than 50 aircraft programs.

"SCADE software has increased Crane’s agility and speed in adapting to new developments in braking control systems."

Gregory MOONEY
Systems Software Engineering Lead - Landing Systems
Crane Aerospace & Electronics

**Aircraft Systems Applications**

- Cockpit Avionics
- Cockpit Displays, Electronic Flight Bags
- Flight Management, Flight Warning, Head-up Displays
- Navigation, Guidance and Inertial Units
- On-Board Airport Navigation

**Engine Controls**

- Engine Control Systems (FADEC)
- Nacelle Controls, Thrust Reversers

**Flight Controls**

- Autopilots, Air Data and Inertial Reference
- Flight Control / High Lift / Slats and Flaps

**Mechatronic Controls**

- Anti-Icing, Braking and Landing Gear
- Doors and Slides, Hydraulic Controls

**Power Systems Controls**

- Fuel Management,
- Power Management, Electrical Load Management System
- Auxiliary Power Units (APU) Controls

**Air Management & Cabin Controls**

- Cabin Pressure and Climate Control, Oxygen Control
- Water & Waste Controls

**Maintenance Systems**

- Health Monitoring & Utility, On-Board Maintenance
- Training and Simulation Systems

**Civilian Programs using ANSYS SCADE Include**

**Wide-Body**

- Airbus A318 Elite, A320 NEO, A340, A350
- Boeing 737 MAX, 787, 747-8
- COMAC C919
- ERJ190/195

**Regional Jets**

- ARJ-21
- ATR 42/72-600
- Bombardier CRJ 1000, C Series, Global 7000
- Embraer ERJ
- Mitsubishi MRJ

**Helicopters**

- Eurocopter EC145
- Sikorsky S-76D

**Business Jets, General Aviation**

- Bombardier Learjet 85
- Cessna Citation Mustang, Encore+
- Dassault Falcon 7X, Falcon 5X
- Diamond Aircraft
- Eclipse 500
- Embraer Phenom 100/300
- Gulfstream G280, G500, G650
- UH-60 Black Hawk

**UAV**

- Piaggio Aero MPA P.1HH Hammerhead
- Xmobots Nauru 500 Series

**Military Systems Applications**

**Military Mission Avionics**

- Helmet-Mounted Displays
- Military Navigation, Guidance and Inertial Units
- Military FMS, Load Management Systems
- Mission Computers, C4ISR* and Radar Displays
- UAV Mission Systems, UAV Ground Stations

**Weapons Systems**

- Gun Turret Controls, Missile Flight Software
- Weapons Stores Management
- Misc. Military Systems

**Ejection Seat Controls, Refueling**

- Tanker Boom Controls, Submarine Controls

**Defense & Space Programs using ANSYS SCADE Include**

- **Fighters and Trainers**
  - AVIC L-15 Trainer, CAE PC-1 Fighter
  - CASA C-101 Aviojet Trainer
  - Dassault Mirage 2000-9
  - Sukhoi Su-35

- **UAV**
  - AVIC 601 Combat UAV
  - Dassault nEUROn

- **Turkish Aerospace TAI**
  - Anka

- **Helicopters**
  - Agusta Westland AW 149, AW 159e
  - Airbus Helicopters Super Puma, NH90

- **Brazilian Air Force**
  - LINK-BR2

- **China**
  - MBDA Mica VL
  - EADS MS1 ICBM

- **Mobile Forces & Land systems**
  - Rheinmetall PUMA

- **Naval & Submarine**
  - BAE Successor
  - DCNS Barracuda Attack Submarine

- **Space**
  - Airbus D&S Ariane 5 Launcher
  - Airbus D&S ATV Cargo System
  - Airbus D&S Vega Launcher
  - Shenzhou & Long March Launchers

**Cockpit Displays, Electronic Flight Bags**
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 ARP 4754A. 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. A key feature, the SCADE System Avionics package, extends and simplifies system design capabilities for the A&D market.

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 Solutions for ARINC 661 Compliant Systems
Development of ARINC 661-Compliant Avionics Displays and User Applications

SCADE Solutions for ARINC 661 Compliant Systems is a fully-integrated COTS solution for the specification, development and certification of avionics displays and applications following the ARINC 661 standard. It can be used to create both ARINC 661-compliant Cockpit Display Systems (CDS) and User Applications (UA).

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.
ANSYS Systems & Embedded Software family Products Users in Aerospace & Defense Include:


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.

DO-178C Qualified Code Generators

With the adoption of DO-178C by the FAA, EASA and other worldwide civil aviation authorities, today's aeronautics manufacturers must meet new certification objectives. The SCADE Suite and SCADE Display KCG Qualified Code Generators, the SCADE Test Environment for Host, and the SCADE Test Model Coverage tools support a model-based approach that satisfies the requirements of DO-330, the tools qualification document within DO-178C, for the highest levels of safety requirements.

ANSYS has the world's largest track record in terms of usage of its SCADE products for DO-178B and DO-178C certified development.

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
- ARINC 661 UA / CDS architecture compliance
- Reduces risk, time, and cost of DO-178 B/C Certification

ANSYS SCADE Solutions Benefits

Best Practices for:

- Model-Based Systems Engineering
- Integrated Multi-physics and Software Simulation
- Embedded Controls Development
- Interactive Displays Development

Development Costs Reduction

Time-to-Certification Speed up

50%

2X

A Success Story - ANSYS SCADE @ Airbus

SCADE is used in the following A350 systems:

Airbus never experienced any bug in flight in our Flight Control System software produced automatically.

Jean-Charles DALBIN
Software / Automatic Code Generation Tool Qualification Expert
Avionics Software
Airbus Operations SAS