



# VxWorks Cert Edition

An RTOS platform for safety-critical applications that require DO-178C, IEC 61508, ISO 26262, IEC 62304, or certification evidence in the avionics, industrial automation, transportation, and medical device industries

VxWorks® Cert Edition provides a commercial off-the-shelf (COTS) real-time operating system (RTOS) solution for delivering safety-critical applications that must be certified to the stringent requirements of safety standards, such as RTCA DO-178C and EUROCAE ED-12C software considerations in airborne systems, IEC 61508 industrial functional safety, IEC 62304 medical device safety, and ISO 26262 automotive safety. With VxWorks Cert Edition, you can take full advantage of technological advances in microprocessors that the VxWorks RTOS enables, with the assurance that you will have a strong OS foundation to meet the most demanding safety certification standards.

## COTS WITHOUT COMPROMISE

### / Avionics

The avionics market has a history of success using standard commercial microprocessors for a variety of flight-critical applications that can directly affect aircraft safety and reliability. To ensure that airborne systems are developed to the rigorous quality principles necessary to meet the demands of a variety of safety criticality levels, the global aerospace community developed the RTCA DO-178C and EUROCAE ED-12C airborne avionics standards to provide guidance on creating, certifying, and deploying these devices. These specifications are now uniformly enforced by a wide range of commercial aviation control organizations, including the U.S. Federal Aviation Administration (FAA), the European Aviation Safety Agency (EASA), Transport Canada, and others.

The aviation community reviewed input from every aerospace manufacturer in the world to create this standard, which specifies 71 objectives that describe recommended software lifecycle and testing guidelines for the aviation industry. Wind River® DO-178C and ED-12C COTS certification evidence includes a complete certification package that meets these stringent objectives, enabling you to achieve a faster time-to-market and giving equipment manufacturers a competitive advantage due to the ability to leverage additional, ready-made technology from Wind River partners.

### / Industrial

Similarly, industrial devices have a history of success using standard commercial microprocessors for a variety of applications that can directly affect safety and reliability. To ensure that industrial systems maintain a consistently high quality to meet the demands of a variety of safety criticality levels, the International Electrotechnical Commission (IEC) developed the IEC 61508 industrial safety standard to provide guidance on creating, certifying, and deploying these devices. These specifications are internationally recognized. Wind River IEC 61508 certification evidence represents a complete COTS certification package.

## / Automotive

The International Standards Organization (ISO) derived the ISO 26262 functional safety standard from IEC 61508 to satisfy the unique needs of the automotive industry and the rapidly emerging safety-critical applications associated with autonomous vehicles. Wind River also offers certification evidence establishing that VxWorks Cert Edition meets the functional safety guidelines of the highest achievable level of software assurance, which is Automotive Safety Integrity Level (ASIL) D.

For both IEC 61508 and ISO 26262, VxWorks Cert Edition is backed by certificates issued by TÜV SÜD, an independent certification authority.

## / Medical

When critical Class III devices (surgical robots, infusion pumps, dialysis machines, pacemaker programmers, assisted ventilators, etc.) are being developed and lives are at stake, medical device manufacturers must rely on safe, secure, and reliable software. Regulatory agencies, such as the FDA (Food and Drug Administration) in North America and the EMA (European Medicines Agency) in Europe, have enlisted IEC 62304 among the harmonized standards with which compliance would make it easier to get regulatory approval to sell and operate medical devices. With new regulatory recommendations, the medical market is being pushed toward lowering costs and accelerating system development, deployment, and operations, all while maintaining high levels of safety and security on the device.

## INTEGRATED DEVELOPMENT SUITE

VxWorks Cert Edition includes the Wind River Workbench development suite, an Eclipse-based collection of tools designed to accelerate time-to-market for developers building VxWorks-based devices. From hardware and board initialization to application development, Workbench provides deep capabilities across the development process in a single, integrated environment with complete platform integration, including powerful tools for debugging, code analysis, and test. Based on the open source Eclipse framework, Workbench can be extended through in-house, third-party, open source, and commercial plug-ins.

In addition to the Workbench Eclipse-based environment, VxWorks Cert Edition provides a full-featured command line build system and debugging tools for your preferred debug environment. These command-line tools can be easily integrated into a customized build or automation system. The Workbench development environment helps reduce development costs and manage code complexity, eases tool integration, and enables standardization on a common development foundation across your entire enterprise.

VxWorks Cert Edition	
Wind River Workbench	Toolchain
Debugger	VxWorks Simulator
VxWorks Cert Edition Binaries	VxWorks Cert Edition Buildable Source
Certified Network Stack*	Wind River Simics*
Certification Evidence*	
DO 178C DAL A Airborne Avionics Safety*	
IEC 61508 SIL 3 Industrial Functional Safety*	
ISO 26262 ASIL D Automotive Safety*	
IEC 62304 Medical Device Safety*	
Partner Ecosystem*	
Certified Graphics	Ada
On-Chip Hardware Debugging	COTS Boards
Wind River Certification Services*	
Education Services and Installation	Platform Customization
System Design	Design Services
Hardware/Software Integration, Middleware, Application Software, & Board Support Packages (BSPs)	Customized Safety Certification Evidence Software

\*Optional

Figure 1. VxWorks Cert Edition

## LEVERAGING THE POWER OF VXWORKS

VxWorks Cert Edition is based on the proven standard commercial version of the VxWorks operating system and includes almost 900 kernel mode application programming interfaces (APIs) and more than 420 user mode APIs, all of which are fully deterministic and deployable under guidelines outlined in the DO-178C safety standards. They include cache, clock, event flag, interrupt, memory management, message queue, ring buffer, semaphore, signal, and task management calls, along with a wide array of C library functions.

Developers can also make use of object-oriented programming using the VxWorks Cert Edition C++ language subset, which includes basic C++ constructs such as classes, inheritance, namespaces, polymorphism, and virtual functions. User mode applications are supported with real-time processes (RTP) to a safety-certifiable environment. The VxWorks Cert Edition RTP API subset allows applications to take advantage of memory protection, thus simplifying software integration between parallel development groups.

## CERTIFICATION EVIDENCE

VxWorks Cert Edition delivers the highest levels of certification evidence for avionics, industrial, and automotive critical infrastructure. In all certification evidence packages, the fully hyperlinked content enables rapid traceability analysis of certification data. The requirements, design, source and binary code, and test case phases are easily navigated using a simple browser. No longer are you required to review stacks of printed and individual computer-based certification artifacts, thereby saving you significant amounts of time.

Specifically, certification evidence packages for VxWorks Cert Edition are optionally available for the following:

### **DO-178C and ED-12C Airborne Avionics Safety**

VxWorks Cert Edition is backed by the industry's most comprehensive set of certification artifacts, which support all RTCA DO-178C and EUROCAE ED-12C Level A objectives. Wind River DO-178C and ED-12C COTS certification evidence contains all of the required DO-178C Level A documentation, the software vulnerability analysis document, full source code, tests, code and test reviews, all test results, and full object-level code coverage listings.

### **IEC 61508 Industrial Functional Safety**

VxWorks Cert Edition supports all the industrial functional safety IEC 61508 Safety Integrity Level (SIL) 3 requirements. This certification package contains the VxWorks Cert Edition Safety Manual, all required IEC 61508 SIL 3 documentation, and the [VxWorks Cert Edition TÜV SÜD certificate](#).

### **ISO 26262 Automotive Safety**

Adapted from IEC 61508 for automotive functional safety, VxWorks Cert Edition is also augmented with certification evidence that meets ISO 26262 ASIL D hazard and risk assessment criteria. This certification package contains the VxWorks Cert Edition Safety Manual, all required ISO 26262 ASIL D documentation, and the [VxWorks Cert Edition TÜV SÜD certificate](#).

### **IEC 62304 Medical Device Software**

The IEC 62304 standard spells out the compliance requirements for software used in medical devices. This standard has been widely adopted by regulatory bodies in the Americas and Europe, as well as within other jurisdictions. To release medical devices to market, OEMs and medical device manufacturers must adhere to the requirements.

## SUPPORTED ARCHITECTURES

Arm® Cortex®

NXP QorIQ®

## WIND RIVER PROFESSIONAL SERVICES

Our CMMI Level 3–rated services organization offers a specialized Safety Critical Services Practice that can deliver safety certification evidence for additional software components. Our services team of engineers has extensive experience delivering design, integration, and optimization services tailored to the needs of your industry and is fully equipped to provide professional certification services at any level, including certified board support packages (BSPs), middleware, and application software. For more information, visit [www.windriver.com/services](http://www.windriver.com/services).

## WIND RIVER EDUCATION SERVICES

Wind River offers technical, hands-on training, mentoring, and on-demand learning. For more information, visit [www.windriver.com/education](http://www.windriver.com/education).

## WIND RIVER CUSTOMER SUPPORT

VxWorks Cert Edition is backed by our award-winning global support organization. We offer live help in multiple time zones, the online Wind River Support Network with multifaceted self-help options, and optional premium services to provide you the fastest possible time-to-resolution. For more information, visit [www.windriver.com/support](http://www.windriver.com/support).

## HOW TO PURCHASE

Visit [www.windriver.com/company/contact](http://www.windriver.com/company/contact) to find your local Wind River sales contact. To have a representative contact you, call +1-800-545-9463 or write to [salesinquiry@windriver.com](mailto:salesinquiry@windriver.com).

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