

# C++test™ for Wind River® Workbench C/C++ Development

## DATA SHEET

### Parasoft C++test™ – Comprehensive Code Quality Tools for Wind River® Workbench

As the software components in embedded systems are becoming increasingly critical, the attention to quality in embedded software increases across the board. Long-standing quality strategies such as testing with a debugger are no longer efficient or sufficient. To further complicate matters, many developers cannot readily run a test program in the actual deployment environment because they lack access to the final system hardware. To address these challenges, code quality needs to be realized throughout the development lifecycle—using a synergy of time-proven techniques for early defect prevention, assisted by automation for implementation and monitoring.

C++test from Parasoft Embedded enables teams to produce better code for embedded systems, test it more efficiently, and consistently monitor progress towards their quality goals. With C++test, critical time-proven best practices—such as static analysis, comprehensive code review, and unit and component testing with integrated coverage analysis—are enabled on the developer's desktop, early in the development cycle. A command line interface enables fully automated execution within regression and continuous integration environments, providing data for monitoring and analyzing quality trends.

For highly quality-sensitive industries, such as avionics, medical, automobile, transportation, and industrial automation, the addition of Parasoft's Web-based audit and reporting system, with interactive Web-based dashboards and drill-down capability powered by a SQL database, enables an efficient and auditable quality process with complete visibility into compliance efforts.

### C++test Wind River Workbench Integration

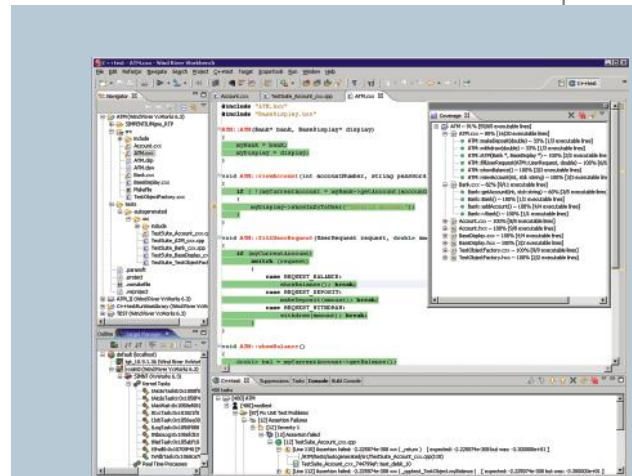
The C++test plugin for Wind River® Workbench provides Workbench users easy access to C++test's full code analysis, code review, and unit testing capabilities directly within their IDE. This seamless integration enables testing and verification to become a natural and continuous part of the development process. The complete target-based test execution flow, including test case generation, cross-compilation, deployment, execution, and loading results back into the GUI, can be automated within C++test. C++test leverages Wind River CDT to provide context-sensitive pop-up menus and views.

C++test is available as a plug in for Wind River Workbench 2.6 and 3.0 IDEs and supports both VxWorks® and Wind River Linux RTOS. In addition, a standalone C++test installation provides built-in support for import and analysis of Tornado® projects. C++test is available for Windows, Linux, and Solaris host platforms.

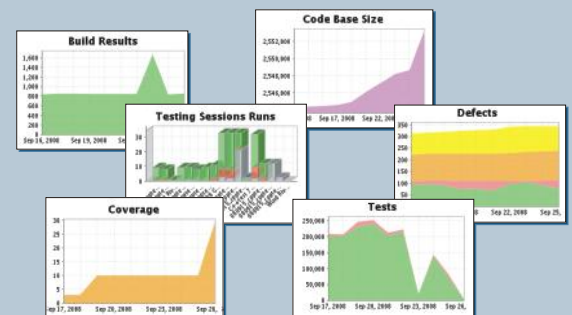
### Automate Code Analysis for Monitoring Compliance

A properly implemented coding policy can eliminate entire classes of programming errors by establishing preventive coding conventions. C++test statically analyzes code to check compliance with such a policy. To configure C++test to enforce a coding standards policy specific to their group or organization, users can define their own rule sets with built-in and custom rules. Code analysis reports can be generated in a variety of formats, including HTML and PDF.

Hundreds of built-in rules—including implementations of MISRA, MISRA 2004, and the new MISRA C++ standards, as well as guidelines from Meyers' Effective C++ and Effective STL books, and other popular sources—help identify potential bugs from improper C/C++ language usage, enforce best coding practices, and improve code maintainability and reusability. Custom rules, which are created with a graphical RuleWizard editor, can enforce standard API usage and prevent the recurrence of application-specific defects after a single instance has been found.



The C++test plugin for Wind River Workbench provides Workbench users with easy access to full C++test feature set right in the IDE. Unit test and coverage results shown.



Dashboards track key development metrics

## Identify Runtime Defects Without Executing Software

The advanced interprocedural static analysis module of C++test simulates feasible application execution paths—which may cross multiple functions and files—and determines whether these paths could trigger specific categories of runtime bugs. Defects detected include using uninitialized or invalid memory, null pointer dereferencing, array and buffer overflows, division by zero, memory and resource leaks, and various flavors of dead code. The ability to expose bugs without executing code is especially valuable for embedded code, where detailed runtime analysis for such errors is often not effective or possible.

C++test greatly simplifies defect analysis by providing a complete analyzed path trace for each potential defect in the Eclipse IDE. Automatic cross-links to code help users quickly jump to any point in the highlighted analysis path.

## Automated Code Review

Code review is known to be the most effective approach to uncover code defects. The C++test Code Review module automates preparation, notification, and tracking of peer code reviews. Status of all code reviews, including all comments by reviewers, is maintained and automatically distributed by the C++test infrastructure. C++test supports two typical code review flows using the IDE facilities:

- Post-commit code review. This mode is based on automatic identification of code changes in a source repository via custom source control interfaces, and creating code review tasks based on pre-set mapping of changed code to reviewers.
- Pre-commit code review. Users can initiate a code review from the desktop by selecting a set of files to distribute for the review, or automatically identify all locally changed source code.

## Unit and Integration Test with Coverage Analysis

C++test's automated testing helps establish correctness and reliability of newly-developed or legacy code. C++test automatically generates complete tests, including test drivers and test cases for individual functions, purely in C or C++ code in a format similar to CppUnit. Alternatively, users can interactively define tests using a Test Wizard. These tests, with or without modifications, are used for initial validation of the functional behavior of the code. By using corner case conditions, these automatically generated test cases also check function responses to unexpected inputs, exposing potential reliability problems. To expand the range of test conditions without increasing test code, tests can be parameterized using data sources.

A multi-metric test coverage analyzer, including statement, branch, path, and MC/DC coverage, helps users gauge test suite efficacy and completeness, and demonstrate compliance with test and validation requirements, such as DO-178B. Coverage reports including file, class, and function data can be produced in a variety of formats.

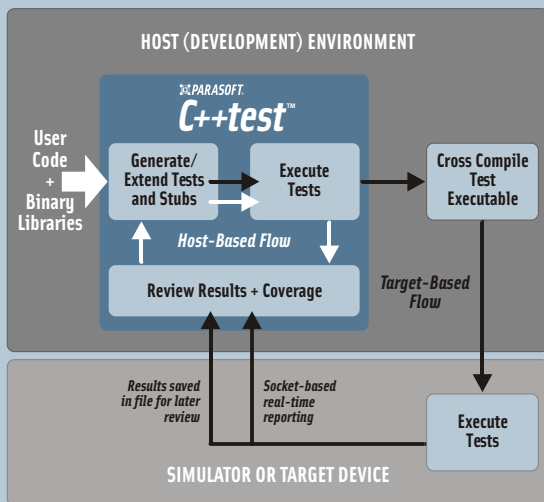
## Test on the Host, Simulator, and Target

C++test supports testing on both host or simulator and target hardware. C++test automates the complete test execution flow, including test case generation, cross-compilation, deployment, execution, and loading results (including coverage metrics) back into the GUI. Testing can be driven interactively from the GUI or from the command line for automated test execution, or performed through batch regression testing. In the interactive mode, users can run tests individually or in selected groups for easy debugging or validation. For batch execution, tests can be grouped based either on the user code they are linked with, or their name or location on disk.

## High Degree of Customization

C++test allows full customization of its test execution sequence. In addition to using the built-in test automation, users can incorporate custom test scripts and shell commands to fit the tool into their specific build and test environment. This unparalleled flexibility enables users to realize their desired test flow without being constrained by the preset tool options.

C++test can be utilized with a wide variety of embedded OS and architectures, by cross-compiling the provided runtime library for a desired target runtime environment. All test artifacts of C++test are source code, and therefore completely portable.



*C++test's customizable workflow allows users to test code as it's developed, then use the same tests to validate functionality/reliability in target environments*

### Advanced Unit Test features:

- Automatic generation of tests and stubs
- Automatic generation of assertions based on observed test results
- Graphical Test Case Wizard for interactive definition of tests
- Complete visibility into test and stub source code
- Intelligent, test-case-sensitive stubs
- Parameterization of tests and stubs
- Multi-metric coverage analysis for DO-178B (including MC/DC)
- Flexible support for continuous regression testing
- Annotation of tests against bug and requirement IDs
- Execution of tests under debugger
- Special mode for testing template code

[www.parasoft-embedded.com](http://www.parasoft-embedded.com)

### Contact info:

Parasoft Corporation, 101 E. Huntington Dr., 2nd Flr., Monrovia, CA 91016

Ph: (888)305.0041, Fax: (626)256.6884, Email: [info@parasoft-embedded.com](mailto:info@parasoft-embedded.com)