

INTEGRATING SCANWORKS® WITH ANY STRUCTURAL TESTER

Structural testers have been the backbone of manufacturing assembly verification for years. But the increased use of high-density packaging has limited their ability to provide the test coverage needed to adequately test high-density boards. IEEE 1149.1 boundary scan is now available in virtually all complex logic devices, picking up coverage where the structural testers left off. However, boundary-scan coverage is limited to where boundary-scan access is available, and requires power on the UUT. A combination of a structural tester and boundary scan can provide the best of both technologies, resulting in overall test coverage that meets the highest requirements.

Structural test tools include In-Circuit Testers (ICT), Flying Probe Testers, (FPT), and Manufacturing Defect Analyzers (MDA). These testers are often the primary tester currently being used for prototype debug and/or manufacturing. Often more than one method is used during the life cycle of a product. These testers may be PC-based or UNIX-based and some may even be Linux based.

ScanWorks is a complete suite of boundary-scan-based test tools, including test development, manufacturing test application, and interactive debug tools. The flexibility of ScanWorks enables it to be easily integrated into your current test flows by enabling your current tester to act as the host, calling ScanWorks when appropriate for test application or board debug.

ScanWorks tests created during prototype debug or for bench-top boundary-scan testing can easily be applied from a structural tester without any data conversion or file format changes. You'll get exactly the same coverage and test results as with the bench-top system.

Integration with another test system as the host allows ScanWorks tests to be initiated from the same operator interface used to run the host tests. The operator interface is most likely a custom UI for the tester, but could be a UI developed in LabView, Lab Windows, Test Stand or similar application. The level of integration depends on the features of the host system and the level of effort you wish to expend.

Highlights

- No test data conversion, executes exactly the same tests as a bench-top ScanWorks system.
- No test regeneration. Reuses tests created for prototype debug.
- Requires only a ScanWorks Manufacturing Station to be integrated with the host tester.
- Full ScanWorks development stations or diagnostic and repair stations can be used to develop or debug tests with the UUT on the host test fixture.
- Test coverage information is available for use by the host tester software.
- Boundary scan test application is transparent to the test operator.
- Test results easily displayed by host tester.

INTEGRATION METHODS

There are three level of integration of boundary scan with structural testers:

- Full Integration
- Internal Integration
- External Integration

Full Integration

A fully integrated boundary scan and structural test solution must have the following features:

- Boundary scan software is integrated with the structural tester software
- Boundary scan controller hardware is built into the structural tester
- Boundary scan testing is managed by the structural tester, completely transparent to the test operator
- Boundary scan test results are automatically merged with the tester test results

The only fully integrated boundary scan and structural tester available in the industry is the ScanWorks for the 3070 product from Agilent. It incorporates ASSET's ScanWorks boundary-scan tools into Agilent's PC-based 3070 in-circuit tester (ICT). Agilent selected ASSET as their partner to provide all boundary-scan-based tools for the future. ASSET and Agilent worked closely together to make sure tests developed on a bench-top ScanWorks system will run seamlessly on a 3070. Features unique to a fully integrated solution are:

- ScanWorks test coverage automatically included in 3070 reports
- 3070 fixture wiring files consider coverage with ScanWorks
- Boundary-scan controller hardware specifically designed for and built into the 3070
- Test results are automatically included in 3070 reports

Contact Agilent for complete details on ScanWorks for the 3070.

Internally Integrated

An internally integrated solution requires the boundary-scan software and hardware to be installed on the same PC that controls the structural tester. Although the software runs on the same PC, the integration of the boundary-scan tests into the structural tester control software is manual, and must be done by the user. Software to combine test results must also be created manually. It is estimated that the first integration by an experienced test engineer could take one day, with following integrations taking less than two hours per UUT.

The boundary-scan hardware is connected to the UUT through a TAP connector on the UUT or the fixture, not through specially designed and optimized tester hardware. Each UUT connection could be unique, requiring a flexible electrical and physical interface. It is recommended that the physical connection to the UUT be provided through a connector mounted on the fixture. The connector should interface to the UUT through buffers and relays that can disconnect the TAP from the UUT to reduce noise during structural testing by the host.

Examples of an integrated solution are the Digitaltest Condor™ Flying Probe tester or the Checksum MDA tester. Agilent 3070 Dual-boot systems and PC-based Teradyne and GenRad testers are also easily supported.

When using this method always make sure the existing host PC is capable of supporting ScanWorks with a fast processor, an available PCI slot, a supported OS, and enough memory. Features unique to the internally integrated solution include:

- Low cost – Only additional cost is a ScanWorks Manufacturing Station license and slightly higher fixturing costs (\$200-300)
- Uses a common PC for both ScanWorks and tester software
- Boundary-scan hardware is installed in the testers host PC

External Integration

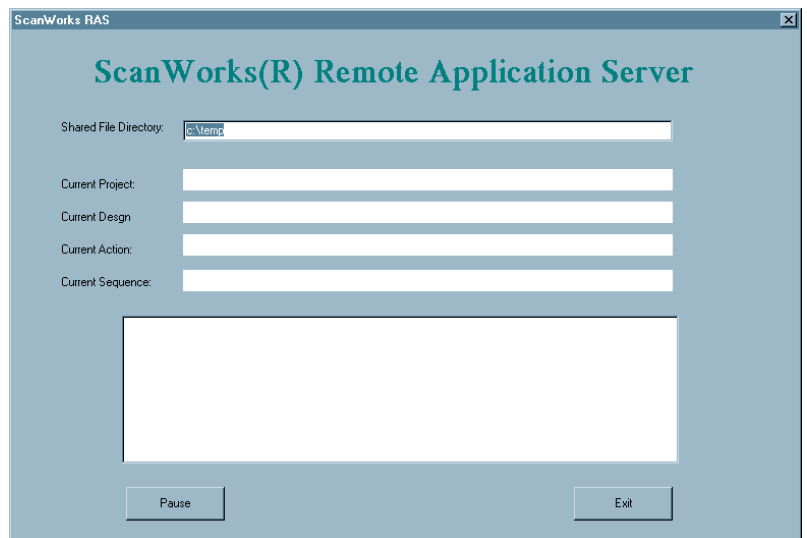
External integration is the most flexible solution but requires the most effort to set up. It enables ScanWorks to be run from any computer that can access a shared file area with the PC running ScanWorks. Also, the ScanWorks PC must be physically close enough to the tester to connect the ScanWorks boundary scan controller hardware to the UUT mounted on the tester.

External integration is supported with the ScanWorks Remote Application Server. The ScanWorks Remote Application Server provides a means of connecting a PC-based ScanWorks system to a tester running on another computer, allowing the test operator to use a single user interface to manage the test process for both the tester and ScanWorks. The host tester computer can use any operating system capable of writing and reading files to a common shared directory.

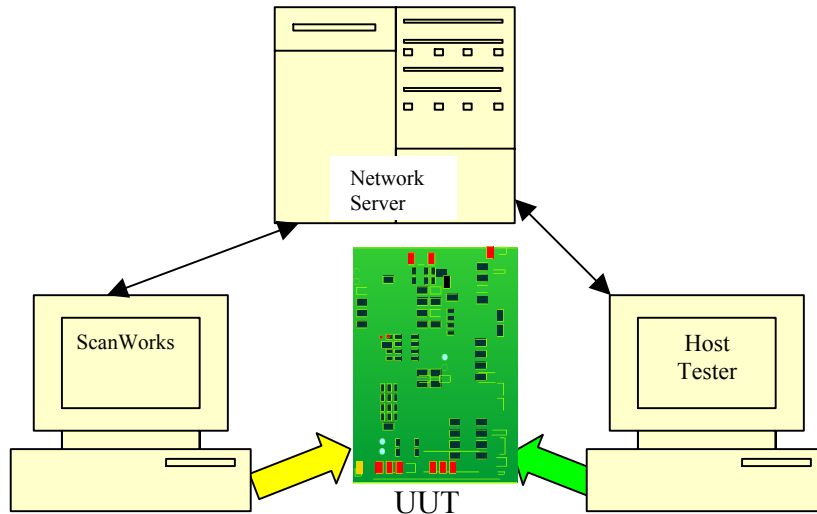
The ScanWorks Remote Application Server software consists of a user interface to ease setting it up for use and software to manage the process of communication with the host tester. The server must be running on the PC on which ScanWorks is installed.

ScanWorks is installed on a PC close enough to the host tester to enable a physical connection from the ScanWorks boundary-scan controller hardware to the TAP signal connector on the

UUT mounted on the host tester fixture. Both the host tester computer and the ScanWorks computer are connected to a shared drive, usually through a network connection. Both computers are able to write to and read from the shared drive for file exchange.



The host tester computer provides the operator user interface and the test management software that controls the entire test process. At the point where ScanWorks tests are to be run, the test management software does the following.



- Initialize the UUT in preparation for boundary-scan tests
- Place a "Semaphore" file on the shared drive. The file contains instructions for ScanWorks.
- Wait for ScanWorks to complete testing by polling the shared drive for the files placed there by the Remote Application Server.

The ScanWorks computer executes the ScanWorks Remote Application software that:

1. Polls the shared drive for the presence of a "semaphore" file placed there by the host tester software. This is a signal for the application to begin step 2.
2. Initiates ScanWorks to perform the boundary-scan tests requested by the host computer by instructions in the semaphore file.
3. At the end of processing, places one or more test results files on the shared drive to be picked up, processed, or displayed by the host tester software.

The data returned to the host in these reports is processed according to programs created by the user and running on the host tester. The extent of the use of this data is dependent on the requirements for the application. Some applications may only display pass/fail information while others may display the diagnostic data provided.

The above solution is very flexible. The most basic case consists of one sequence being run against the UUT, and the return semaphore containing just pass-fail information. Additional levels of detail could be introduced to get the following areas and levels of information back to the ICT:

- Diagnostic reports in original ScanWorks format – either in HTML or text formats
- Additional reports containing more granular diagnostic information in comma-delimited or XML format

FEATURES

- Low cost – Run-time only software with choice of hardware interface types
- Flexible - Supports any tester type
- Portable - Solution enables gradual implementation as need demands
- No test data conversion, executes exactly the same tests as a bench-top ScanWorks system
- Can be used with full ScanWorks development stations or diagnostic and repair stations to develop or debug tests on the host tester
- Network licensing enables cost effective use of test resources
- Integrated into the host testers test executive
- Test results easily processed by host tester for display or analysis