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25%
Cost Savings
in ICT Test
Development

Agilent ScanWorks™ Completes Successful Assessment at Jabil Circuit

One of the first places electronics manufacturers look to reduce expenses is through the elimination of redundant effort. Jabil Circuit, Inc. one of the top Electronic Manufacturing Services providers was first to perform early assessment of Agilent Technologies' and ASSET InterTech's joint effort to enable manufacturers to leverage boundary scan tests across the product life cycle.

Agilent And ASSET Realize the Vision of Test Re-Use

Boundary scan tests are increasingly created at the benchtop in the R&D department during design to help debug a new board. Boundary scan tests are often then recreated at in-circuit test, adding cost and time to product deployment. The Agilent 3070 integration of ASSET's ScanWorks suite of products eliminates that redundancy. ScanWorks for the Agilent 3070 in-circuit test product enables manufacturers to realize the broader vision of leveraging boundary-scan tests through every phase of the manufacturing process, not only in-circuit test, but also in the production line repair loop, at functional and environmental test, and even in field troubleshooting and repair.

Jabil Circuit Evaluates ScanWorks for the Agilent 3070

Test engineering departments at Jabil Circuit in San Jose, California and

The Evaluation Board

For the purposes of the trial run of ScanWorks on the Agilent 3070, Jabil chose a board with 852 nodes, 131 of them without electrical access. The board had 492 devices, 14 of them digital. Four of those were boundary scan devices tested using ScanWorks:

- Xilinx xc95144xl
- XC2V3000
- Two 117 pin BGAs

In addition, multiple non-boundary scan devices were tested through the boundary scan chain including two each of the following:

- SRAM (Toshiba TC55W800)

- Pipelined Synchronous SRAM (IDT 71V3556)

Finally, two devices were programmed using the ScanWorks boundary scan chain:

- Xilinx XC95744X1 PLD
- AM291v033 Flash

The Boundary Scan Tests

The following ScanWorks tests were imported and executed on the 3070 ICT tester:

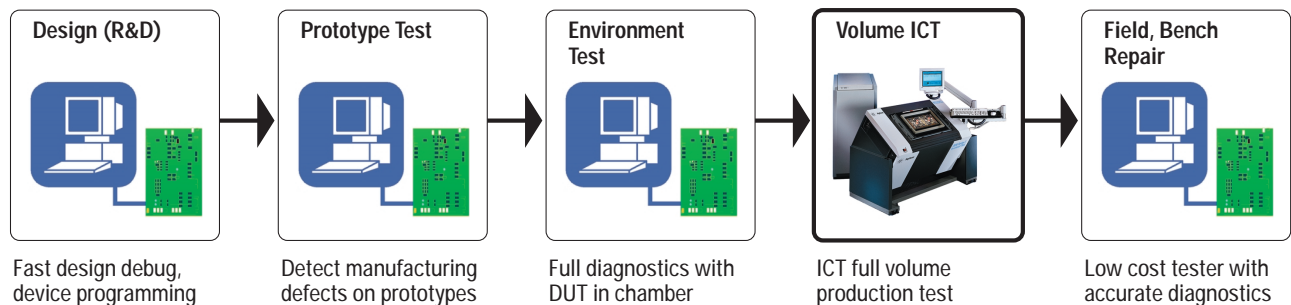
- Chain integrity test
- Interconnect test
- 4 memory interconnect tests
- Flash programming via the scan chain
- ISP device programming

St. Petersburg, Florida, USA, worked with Agilent to evaluate an early copy of ScanWorks for the 3070. The initial findings indicated that the tests were highly stable and required minimal engineering efforts. It was estimated that this test strategy reduced the cost of ICT test development and fixturing

for the evaluation board by 25%. This savings assumes that the ScanWorks tests were created in R&D and re-used at ICT. ICT test development costs may vary with other boards or designs.

Life Cycle Approach to Boundary Scan Test Reuse

Develop test once, re-use throughout product life cycle



Boundary-scan Test Implementation Time Reduced from Days to Hours

In this evaluation, rather than creating boundary scan tests from scratch after getting the board from the designer; Jabil ICT test engineers received completed ScanWorks tests. In a matter of hours, they had imported those tests into the Agilent 3070 environment and completely debugged them. Total debug time was less than 30 minutes. This was an improvement over the common scenario of recreating and debugging boundary scan tests at ICT.

Quick Time to Proficiency

Boundary scan tests have a reputation for complexity requiring the skill of specially trained programmers. ScanWorks for the Agilent 3070 simplifies ICT test development by leveraging existing boundary scan tests. In addition, the scan tests developed in R&D are often superior because the design engineer has a better working knowledge of the board. The only development skill required at ICT is the import of the ScanWorks tests.

After attending a one and a half day training class, the ICT test engineer was able to quickly import and debug the ScanWorks boundary scan files with minimal guidance from Agilent.

Stable, Reliable Results

The ScanWorks tests on the Agilent 3070, which were executed at a fast 14MHz TCK rate, proved to be highly reliable and stable:

- **All faults identified:** Forty-two production boards with eight inserted faults were tested with the Agilent 3070 ScanWorks solution. The 3070 identified and accurately diagnosed all of these induced faults across all boards.
- **No false failures:** All good boards passed. Jabil also ran a known-good board 100 times on the Agilent 3070 without a single false failure.
- **Minimal ground bounce:** Historically, one of the primary reasons for boundary scan test failure is ground bounce. With the innovative integration of the ScanWorks and 3070 hardware, the tests on the trial boards suffered no ground bounce issues.
- **Integrated 3070 diagnostics:** The team successfully demonstrated a single, integrated repair ticket that combines both ScanWorks Interconnect Test and standard 3070 ICT diagnostics.
- **On board programming:** All flash and PLD devices were accurately programmed on-board via the boundary-scan chain utilizing the ScanWorks tools although that Flash programming times were much higher than with conventional parallel access methods via the Agilent 3070. Programmed device contents were subsequently verified at functional test.

- **Dual stage fixturing was not required:** Full probe contact during the ICT testing did not negatively impact the stability of the ScanWorks tests running on the 3070.

Conclusions

Jabil proved the concept of ScanWorks for the Agilent 3070 in a real manufacturing environment. They successfully transferred boundary scan tests and device programs directly to ICT, saving an estimated 25% in test development cost at ICT on the evaluation board. The Agilent ScanWorks solution has proven that the same boundary scan tests developed to validate prototypes during design can be used at in-circuit test, paving the way for similar re-use in production repair, functional and environmental test and even in field trouble shooting and repair.





ASSET InterTech, Inc. is an international leader in IEEE 1149.1/JTAG boundary scan test. Customers of its ScanWorks products include Cisco, Lucent Technologies, Agilent, Vivace Networks, Ericsson, Intel, Rockwell Collins, and EMC.

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Printed in the U.S.A.

March 21, 2003

5988-9195EN

