

Ricoh and Cadence

“With the Incisive vManager solution and MDV methodology, we significantly improved our large-scale integration verification process by adding automation to capture missing test cases and progress management.”

Hiroyuki Shibaki, ASIC Design and Verification Manager, Ricoh

The Customer

Ricoh is one of the leading providers of office equipment, such as multi-function printers, fax machines, and related supplies and services. For the data center, in-plant, print-for-pay, and commercial print markets, Ricoh offers a range of mono and color production printing systems, all of which contain multi-function ASICs to control the device.

The Challenge

Ricoh needed to speed up the development cycle for its multi-function printer ASICs in order to keep pace with the fast-moving market for these products. While analyzing issues encountered during previous ASIC projects, Ricoh uncovered two significant opportunities for improvement. First, the company noted that there wasn't an effective solution to avoid missing test cases and or test implementations. There were too many opportunities to introduce errors into the testing process simply through omissions. Noted Hiroyuki Shibaki, ASIC design and verification manager at Ricoh, “We saw, for example, that 16% of the time, there were incomplete design specifications, and 8% of the time we had omitted tests from the test strategies. About 22% of our errors stemmed from insufficient data extraction into the testbench and wrong test implementation due to misinterpretation of the specification.”

Second, the company was spending too much time—about three hours each day—just capturing the verification status for progress management manually from a team of 26 verification engineers. This excluded time spent diagnosing actual problems. Ricoh needed to automate this data collection and filtering process, so the engineers could start resolving problems sooner.

Business Challenges

- Accelerate development cycle for multi-function printer ASICs
- Automate verification management process

Design Challenges

- Lack of effective solutions to avoid missing test cases
- Need to minimize time spent capturing verification status before actual problem solving

Cadence Solution

- Incisive® vManager™ solution
- Incisive Enterprise Simulator
- Metric-driven verification (MDV) methodology

Results

- vManager solution addresses approximately 22% of the missing or incomplete test case issues
- 2.5 months saved in data collection and reporting time
- Ability to start resolving issues earlier in the design cycle

The Solution

To enhance and also streamline its testing and verification management processes, Ricoh knew it needed to take a different approach with automation, rather than only focus on working smarter. The company selected a new method and new automation tool for verification planning and management, Cadence Incisive vManager solution. Part of the solution addressed the linking of design specifications to the test environment, and the other part addressed automation for data collection and reporting. Since the company was already using Cadence Incisive Enterprise Simulator, it was a natural fit to choose the Incisive vManager tool, which natively integrates with Incisive Enterprise Simulator.

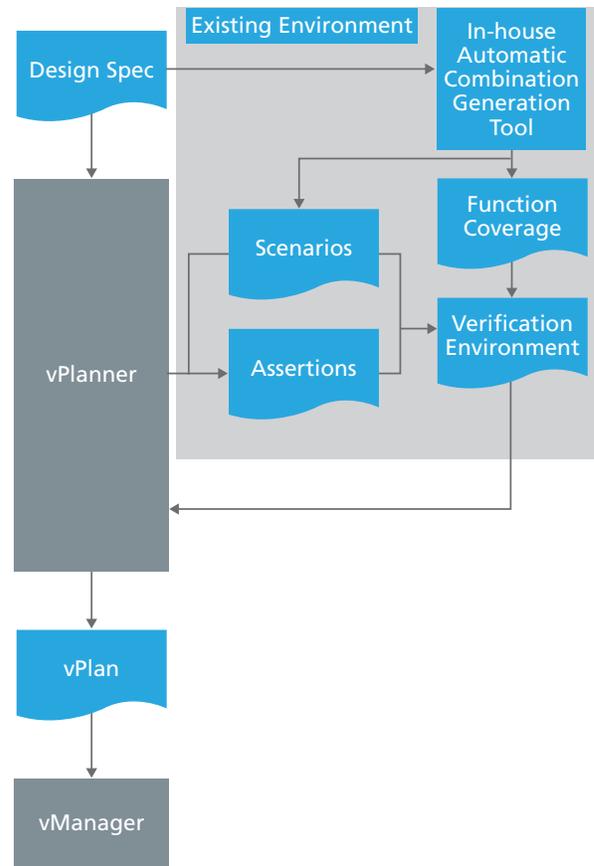
Along with the tool, Ricoh also implemented Cadence's metric-driven verification (MDV) methodology. The MDV flow, using Incisive Enterprise Simulator, is designed to enhance verification quality, increase schedule predictability, and improve team productivity. With this methodology and the simulation tool, Ricoh verification engineers can use specifications to create verification plans, measure their progress, and determine when they've achieved high-quality verification closure.

Ricoh found that by working smarter, engineers could address about 65% of the typical manual errors in the verification process. However, about 22% of the issues could still benefit from better coordination between the design specification and the test specification—which could have a big impact on productivity and quality. Using vPlanner™, the planning tool within the Incisive vManager tool, Ricoh was able to link between the design specification and test specification to reduce the occurrence of insufficient data extraction into the testbench. With the linking between the test specification and test environment, Ricoh was able to reduce the incidence of missing test implementations.

Results

Through its new process, Ricoh discovered that distinguishing items between use cases and functional tests makes reviews much easier. Use case test items are checked to see if test cases and assertions in question are sufficient. Function tests are checked to reveal coverage which shows whether variables in question had sufficient variations/range. As an added benefit, the engineers also discovered many re-usability and change management aspects of the vPlanner tool.

The second big value for the Ricoh team was the automation of its data collection and push-button reporting process. This has saved about 350 work hours (about 2.5 months) of manual data collection and reporting work.



The vPlanner tool in the Incisive vManager solution provides a link between the design specification and the test specification, reducing the occurrence of insufficient data extraction into the testbench.

“With the Incisive vManager solution and MDV methodology, we significantly improved our large-scale integration verification process by adding automation to capture missing test cases and progress management,” said Shibaki.

Summary

The Incisive vManager and MDV solution provided enough new approaches and productivity results for Ricoh for the engineers to call the project a success. “We created an easier linking from design specifications to test environments and an easier specification change management by showing the differences. We believe we can improve 22% of the issues, which we couldn't without these tools, ” said Hagiwara. With automated data collection and reporting, Ricoh can now start actual issue-solving much earlier.

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