cādence®

Spansion and Cadence

"With Cadence Virtuoso tools, we reduced our time to release PDK to production by 50% and decreased the cost of PDK testing and qualification by 50% by consolidating our workflow for PDK development and qualification."

Dinraj Shetty, Director, CAD and Methodology, Spansion

The Customer

Spansion is a leading provider of Flash memory technology for electronics systems. The company's products power many critical technologies—from routers running the Internet to consumer and automotive electronics that enrich people's daily lives.

The company has a diverse Flash memory product portfolio, award-winning MirrorBit charge-trapping technology, and industry-leading services and support. Around the globe, original equipment manufacturers (OEMs) in the automotive, consumer and gaming, communications, and industrial segments rely upon Spansion solutions.

The Challenge

Spansion first approached Cadence in 2007 when its electronic design automation (EDA) tools ran out of steam. The company recognized its need for a much more automated, industry-standard solution to improve designer productivity and compress time to market.

Spansion met these challenges by working with Cadence Services to develop a full front-to-back analog/mixed-signal design flow. Spansion designers can now go from design through implementation and verification with a single, integrated design flow. The driving force behind a mixed-signal design flow is always the process design kit (PDK). Cadence introduced a set of tools and methodology for efficiently developing and testing PDKs.

"With Cadence® Virtuoso® tools, we reduced our time to release PDK to production by 50% and decreased the cost of PDK testing and qualification by 50% by consolidating our workflow for PDK development and qualification," says Dinraj Shetty, Director, CAD and Methodology, Spansion. "We have consoli-

Business Challenges
- Improve designer productivity
- Compress time to market

Design Challenges
- Incorporate a more automated approach to custom layout
- Adopt a front-to-back analog/mixed-signal design flow

Cadence Solutions
- Virtuoso custom design technologies
- PDK Automation System (PAS)
- System for Testing PDKs (STeP)

Results
- Decreased time to release a PDK to production by 50%
- Decreased cost of PDK testing and qualification by 50% using STeP
- Consolidated workflow for PDK development and qualification by reducing integration time

dated our workflow and are addressing our interoperability goals. Another important benefit is our access to the deep reservoir of Cadence development and testing expertise."

"We drove the project in terms of enhancements and feature fixes, and Cadence was there every step of the way to make sure that the PDKs were fine-tuned to our memory design needs."

Building the PDKs

Each Spansion PDK is a complete set of technology files to enable analog/mixed-signal custom IC circuit design—outlining a specific foundry process and serving as a database.

The Spansion PDKs were developed using the PDK Automation System (PAS), which includes a graphical technology editor, verification run-set generators, parameterized cell (Pcell) generators, and the Design Framework II (DFII) library builder. The technology reduces PDK development time and maintenance costs by capturing and maintaining PDK-related data in a single document, and by generating design rules, Pcells, and DFII libraries from a single source.

"PAS enables us to automatically abstract code to create templates or macros," Shetty says. "We can create parts that can be recycled or reused. For example, we can build hierarchies in the code and enter it into the database. The resulting code is compiled into the PDK and can be done in batch or by GUI."

Testing the PDKs

After Cadence collaborated closely with Spansion to develop the PDKs using PAS, Spansion decided it wanted to develop and maintain its PDKs moving forward. At this point the company engaged with Cadence to develop a robust technology to test PDKs using System for Testing PDKs (STeP) for quality assurance (QA).

"The Cadence team worked with us to develop the test suite, and to ensure that it would continue to meet our constantly evolving requirements," Shetty says. "We drove the project in terms of enhancements and feature fixes, and Cadence was there every step of the way to make sure that the PDKs were fine-tuned to our memory design needs."

Using STeP, Spansion has been able to standardize its testing efforts. The company appreciates that the Cadence QA tool is so widely used and proven in the industry. "This gives us access to a wide range of knowledge, expertise, and growth potential that we couldn't possibly achieve with ad-hoc QA testing," Shetty says.

Additional Benefits

"As we move forward with development and testing of our PDKs, we value the high level of abstraction that enables us to easily make updates," Shetty says. "Our needs are constantly evolving and we will always need to tune and adjust to meet market requirements."

Spansion also enjoys the global presence of Cadence Services, which has provided support for Spansion in the U.S, Europe, and Asia.

Summary and Future Plans

Using Virtuoso technologies, including PAS and STeP, Spansion developed and tested new PDKs to meet its EDA needs. The company reaped many benefits, including greatly decreased development and maintenance time and costs.

"The best testament to our working relationship with Cadence is that we signed an original Cadence Services contract four years ago, and in 2009, we renewed our contract for another three years," Shetty says. "Cadence has become an integral part of our team and we look forward to working together for many more years."

cādence®

Cadence is transforming the global electronics industry through a vision called EDA360. With an application-driven approach to design, our software, hardware, IP, and services help customers realize silicon, SoCs, and complete systems efficiently and profitably. **www.cadence.com**