

# Genesis Microchip and Synopsys

DesignWare Memory Models help image processor reach the market on time

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**Dr. T. Chan, Senior Vice President of Engineering, Genesis Microchip**

## **Solution**

Synopsys DesignWare Memory Models

## **Benefits**

- Acquired models for all required combinations of memory device types, manufacturers, and configurations
- Began production use within hours
- Obtained feedback that helped with debugging
- Received excellent support and top quality documentation
- Identified and repaired all design flaws
- Completed testing quickly and successfully for all combinations
- Fulfilled needs of customers, who have now released products to the market

## **Issues**

- Need to test design for hundreds of memory case combinations
- Memory models non-existent or difficult to work with
- Tight schedule

## **Overview**

Genesis Microchip had to test its business-critical Cortez image processor design against many combinations of high-speed memory devices, but there was very little time to complete the verification. Genesis chose Synopsys DesignWare Memory Models to reduce the time they spent in memory interface verification. The project was a complete success — Genesis tested all possible memory device combinations, found and fixed all flaws the testing revealed, and met its tight schedule. Now flat panel televisions and displays incorporating Cortez are selling well in stores, while Genesis—armed again with DesignWare Memory Models is busy on the next generation of cutting edge image processors.

“Since Synopsys and previous users had already done the quality assurance, we had a lot of confidence in the DesignWare Memory Models,” says Chan. “Our confidence was justified. They met or exceeded all our expectations. We had no issues using them, and they allowed us to get the job done quickly, inexpensively, and completely. You can’t ask for more than that.”

### **Testing Requires Hundreds of Memory Combinations, and DesignWare IP Provides Them All**

Genesis Microchip Inc. is a leading provider of image processing systems enabling superior picture quality in flat-panel TVs and a variety of consumer and PC-display products. Featuring Genesis Display Perfection and Emmy award-winning Faroudja video technologies, Genesis’ system-on-a-chip solutions are used worldwide by display manufacturers to produce visibly better images across a broad array of devices including flat-panel displays, digital TVs, projectors and DVD players/recorders.

One of Genesis’ most important products is the highly integrated FLI8532 flat-panel television controller, code-named Cortez, which powers state of the art large-screen televisions and computer display devices from such manufacturers as LG Electronics and Toshiba. Cortez interfaces with Graphics DDR SDRAM (GDDR) memory devices in these products.

When Genesis engineers were finalizing the design of Cortez, they faced a substantial challenge verifying the design for all the various memory environments with which customers might interface the chip. They had to test for all the memory devices provided by all the industry’s DRAM manufacturers, in all their configurations. To be really sure the design was sound, Genesis had to test it for all combinations of manufacturer, device, and configuration — hundreds of cases all told.

“Memory models didn’t exist for many of the devices, and others existed only as pre-compiled Verilog models that we could not easily get to work in our simulation environment,” says Dr. T. Chan, Senior Vice President of Engineering. “Cortez is core to our business, and it was vital that we test it completely. On top of everything, we were facing a tight deadline that didn’t leave us much time. Fortunately we found the ideal solution — DesignWare Memory Models from Synopsys.”

### **Initial Download to Production Use Within Hours**

Genesis uses Synopsys solutions in its design environment, and the company already owned a DesignWare Library license. Because the memory models were readily available for no extra charge under this license, and because of the confidence Genesis had developed in Synopsys solutions, they opted for DesignWare Memory Models. Genesis downloaded the memory model library and had no trouble finding all of the models they needed from the selection of over 10,000 that Synopsys provides. These models proved to be very easy to install and use, and were operational within just a few hours.

Using the DesignWare Memory Models, Genesis proceeded to validate the design for all possible combinations of manufacturer, device, and configuration. Whenever verification indicated a failure, Genesis received valuable information from the memory models that helped pinpoint protocol and timing violations for debugging the problem.

The quality of the DesignWare documentation, and the timely and competent support that Synopsys provided whenever requested, helped speed the test and verification process.

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#### **Alternative Approaches Fraught with Risk and Expense**

Genesis would have been faced with difficult alternatives if the DesignWare Memory Models had not been available:

1. Struggling with pre-compiled Verilog models or creating new ones. This option would have added weeks or months to an already tight schedule, consumed considerable talent, and at best produced results that lacked the functionality and flexibility of DesignWare Verification IP that proved so important in debugging the design.
2. Securing memory models from another source. Besides the unknowns associated with a new vendor, this would have been a very expensive option in comparison to the DesignWare Memory Models, which were available as part of the DesignWare Library license at no extra charge.

3. Performing sign-off using fewer case combinations. This option would have been risky because of the potential for design flaws to survive in the finished product, to be revealed only in customer testing or deployments.

#### **On to the Next Generation with DesignWare Memory Models**

Before LG Electronics, Toshiba, and other flat-panel television and display industry leaders incorporated Cortez chips into their latest products, they first put them through their own rigorous test and verification processes. Cortez met these companies' high standards, demonstrating that indeed Genesis had succeeded in wringing all the bugs out of the design, and that the DesignWare Memory Models constituted a valid testing environment.

Now flat panel televisions incorporating Cortez are available in retail outlets, and Genesis is designing next-generation image processors that will introduce further improvements. When it comes time to test their designs, there is no doubt that Genesis will once again use DesignWare Memory Models.

“We highly recommend DesignWare Memory Models from Synopsys to anyone creating designs that interface with DRAMs,” concludes Chan. “They are the right choice for our design verification. With high quality, ease of use, model availability and excellent documentation, we maximize the likelihood of chip success.”

**For more information about DesignWare products, visit [www.synopsys.com/designware](http://www.synopsys.com/designware)**



700 East Middlefield Road, Mountain View, CA 94043 T 650 584 5000 [www.synopsys.com](http://www.synopsys.com)

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