



## CADENCE AND ANCHOR BAY

Cadence Incisive Xtreme III Accelerates Simulation While Preserving Anchor Bay's Familiar Verification Environment

“The decision was an easy one because the Cadence Xtreme III system delivered a level of dynamic control unlike any other. We were hoping to be able to change the state of our environment from the simulator to the accelerator and vice versa. This instant swap, or *hot swap*, feature allows us to remain in our familiar simulation environment and is unique to this platform.”

**Martin Jahner, Staff Engineer, Anchor Bay Technologies**

### CORPORATE PROFILE

- Anchor Bay specializes in advanced video processing chips and system-level solutions for high-definition digital television and high-resolution digital video products

### BUSINESS CHALLENGE

- Speed time to market of advanced digital semiconductor solutions for next-generation digital television and high-definition digital video products
- Speed up verification tests involving high-definition video test cases
- Preserve the company's proven, well-liked simulation environment

### CADENCE SOLUTION

- Cadence Incisive Xtreme III boosts design team verification productivity with instant “hot swap” among simulation, acceleration, and emulation

### CADENCE PRODUCTS

- Cadence Incisive Xtreme III series

### KEEPING PACE WITH THE FAST-MOVING HDTV MARKET

Anchor Bay specializes in developing advanced processors for the high-definition TV and high-resolution digital video products marketplace. Anchor Bay's semiconductor solutions feature the company's Video Reference Series (VRS) technologies that perform advanced video processing tasks, such as precision video scaling, precision de-interlacing, noise reduction, image enhancement, and progressive reprocessing to deliver sharper, cleaner, artifact-free pictures for a stunning viewing experience. The company's many customers—leading consumer electronics manufacturers—select Anchor Bay video processing semiconductors for performance, easy implementation, and attractive prices.

To keep pace with the tremendous demands and multiple design cycles of the TV and video products market, Anchor Bay must achieve and maintain fast time

to market with each product release. Consequently, verification plays a huge role in the company's chip development efforts, as respins must be avoided at all costs.

### SIMULATION ALONE IS SIMPLY TOO SLOW

The verification process for Anchor Bay's VRS chips involves dealing with high-resolution video frames with an enormous amount of data. Rendering a single 1080p frame can take up to 12 hours with a conventional simulator.

“Our video test cases can be very long,” said staff engineer Martin Jahner. “In simulation, a high-definition video stream can consume days, or even more than a week.” The company's processors need to read and analyze multiple input frames before the first output frame is created. According to Jahner, runtimes multiply quickly and pure software simulation is really no longer an option for effective verification.

The Anchor Bay design and verification team decided to add hardware acceleration to reduce regression runtime. "We put quite a bit of effort into our simulation environment," said Jahner. "We set up proper flows for creating targeted input stimulus. We use reference models to compare various processing steps and have even created a way to combine all this into a top-level simulation environment. So our goal was to keep all that in place while finding a way to increase throughput," he added.

## UNIQUE INSTANT SWAP CAPABILITY BOOSTS PRODUCTIVITY

Jahner and team chose the Cadence® Incisive® Xtreme® III system for hardware acceleration. "The decision was an easy one because the Cadence system integrated with our environment flawlessly and delivered a level of dynamic control unlike any other. We were hoping to be able to change the state of our environment from the simulator to the accelerator and vice versa. This instant swap, or "hot swap," feature is unique to this platform," said Jahner.

"I have created something I call a 'testbench processor,' which controls the execution of each test case," said Jahner. He uses it to set up the device under test (DUT) in the correct operating mode, start the video stimulus, and control output data capture. "It can respond to a number of events from the DUT. Since not all of these

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*Martin Jahner, Staff Engineer, Anchor Bay Technologies*

events can be handled in synthesizable code, the testbench processor can switch back into software simulation as needed and then hot-swap back into acceleration mode when the behavioral tasks are completed," he explained.

Jahner said that Anchor Bay found it easy to migrate from software simulation to targetless emulation and now run nearly 185 times faster. For instance, where a single video frame in simulation used to take 68 minutes to render, it is now rendered in just seconds (22 of them, to be precise) with the Xtreme III system.

## MEETING THE PERFORMANCE NEEDS OF VIDEO

The Incisive Xtreme III system gives Anchor Bay the ability to stream very large video files through their designs. "We can load a frame of the video file into memory and when the frame is exhausted, we use a Verilog® task to load the next frame into memory," said Jahner. "By being able to run a large amount of data in accelerated

mode we gain a huge increase in performance versus using a simulator. At the same time, we never have to worry about loading the entire test stimulus into memory. Similarly, we collect output data in an internal buffer and write it to a file only when the buffer is full. This avoids calling file I/O tasks too often and impacting performance."

A value-change-dump (VCD) on-demand capability is among the many productivity-enhancing features Jahner and team like about the Incisive Xtreme III system. VCD-on-demand provides fast access to all node history values from any point in simulation without the need to re-simulate from time zero, which is another obvious time-saver.

"We're thrilled with the system," said Jahner. "With Xtreme III, our design team can create and modify architectures much quicker and earlier in their design flows. It gives us the ability to do mixed-HDL logic simulation, simulation acceleration, and in-circuit emulation. That versatility is really a huge asset in our environment."

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