

# videography

post



## Accessing Matrox Axio

CAN IT REALLY DELIVER REAL-TIME, MULTI-STREAM HD?

**M**y first job out of college was as an online editor. During the heyday of linear post, I turned out some pretty complex effects work in a post world that was dominated by dedicated hardware systems. Even as the industry moved to nonlinear editing systems, the process of creating effects and transitions relied on specialized hardware inside the computer. I often find the world of software NLEs lacking because most companies' promises of real-time performance generally come with the disclaimer "preview." In other words, you have to



wait for the system to render before the job is done.

I got a peek at a preliminary version of

Matrox Axio last year. It's taken until this year to finish the development, but the wait has been worth it. Matrox Axio delivers guaran-

teed real-time, multi-stream SD and HD performance in a fashion that positions it with top-of-the-line NLEs but in a price bracket occupied by software-based editing workstations. Hardware-accelerated systems have traditionally had limited expandability because the architecture becomes frozen in time once the product starts to ship. Matrox developed a hybrid architecture several years ago, with its series of RT.X cards, that enables the hardware to share effects processing duties with the CPU. This design philosophy has been carried forward into Axio, so as computers get faster, your system becomes more powerful, even with the same set of boards.

Matrox Axio HD guarantees two layers of uncompressed 10-bit HD video plus two layers of graphics, complete with real-time effects such as color correction, transitions

processing. Axio comes in SD and HD versions, with a breakout box specific to each. The HD version also handles SD video, of course. In fact, the software is the same, so by swapping or upgrading the breakout box, you can change a system from SD to HD. Matrox Axio operates under Adobe Premiere Pro, which is coded as an application into which many elements can be installed. Part of Matrox's development includes a wide range of media codecs. The list of supported codecs currently includes native DV/DVCPRO, DV50, compressed MPEG-2 I-frame (SD and HD) and uncompressed 8-bit and 10-bit SD and HD. The most important feature of the Axio media framework is that you can mix these various formats on the same timeline; if the frame rates match, they'll play in real time. Native HDV and DVCPRO HD editing

read/write rates—to achieve the highest quality. The computer's display card is definitely not used for effects.

Matrox has invested heavily to develop the expertise in code optimization for both AMD and Intel processors that enables their products to deliver powerful real-time effects at the highest quality. With Matrox Axio, there is no need to render to see the final result. Axio guarantees full quality, full frame rate, full resolution playback of real-time effects at up to 1080i at 29.97fps. Axio's architecture allows all CPU-based processing to be performed at full YUV 4:2:2:4 10-bit quality. Whether the effects are processed using the CPU or the Flex 3D engine is transparent to the editor.

Matrox has written specific effects filters, including color correction and DVE moves, that are accelerated by Axio, but it has also accelerated the functions of many standard Premiere Pro effects, including dissolves and Motion tab parameters (scaling and positioning). Previous real-time Matrox effects used in the RT.X and DigiSuite products were designed with their own interface and keyframe models, but Axio's have been redesigned so that they conform to the Adobe API and look.

Matrox Axio HD retails for \$11,500 (\$7,500 for SD); systems are sold through resellers as turnkey solutions. The Matrox price includes the standard version of Adobe's Video Collection, so you'll also get Encore (DVD authoring), Audition (audio post) and After Effects Standard (motion graphics). Typical configurations—built on the HP 8200 and HP 9300 workstations—use one of several qualified drive arrays, including those from Huge Systems/Ciprico, Rorke Data and Nexsan. You should budget in the mid-\$30K range for a complete HD system.



and 3D DVE moves. This level of performance is based on a dual-processor HP 8200 with Intel CPUs. The same hardware running on a dual-processor HP 9300 configured with the new dual-core AMD chips easily exceeds these published specs. This is a tangible example of how Matrox leverages the power of the CPU with what they call the Power of X. The number of allowable layers and effects is generally twice as high with uncompressed SD video.

### WHAT MAKES AXIO TICK

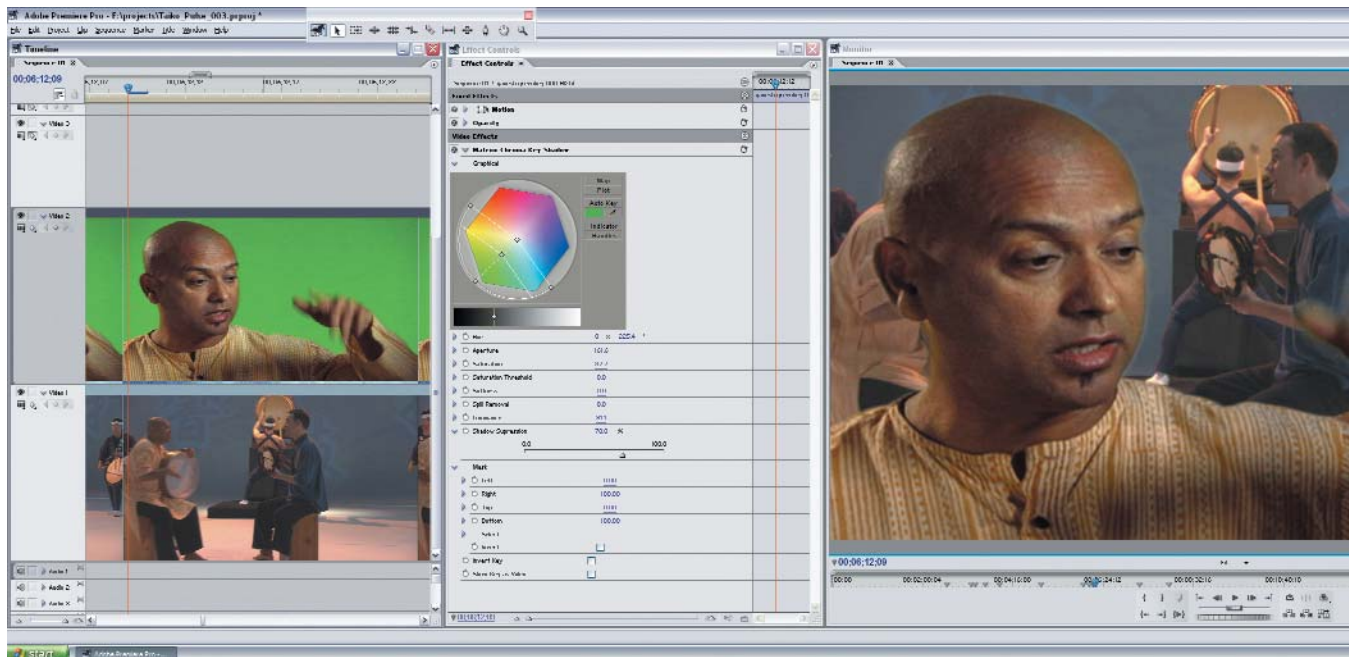
Matrox Axio hardware consists of two PCI-X boards tethered to an external breakout box: one card handles I/O and the other effects

will be added in the next Axio release, scheduled to be available by the end of 2005.

Codecs are the nuts and bolts of pumping video through an NLE, but it's the effects that viewers and editors respond to. Matrox Flex 3D is a programmable architecture that applies real-time 3D texture mapping to video. Many systems offload the 3D DVE work to the computer display card, such as those from Nvidia and ATI. Unfortunately, these cards aren't fast enough to properly handle 10-bit video effects in real time. Matrox manufactures its own line of display cards. Axio's effects processing card employs Parhelia GPU technology—where the bus architecture will support the necessary

### WORKFLOW

Matrox engineers worked hard to devise an efficient workflow for all of the codecs and effects the system handles. The Matrox Axio



offline HD codec (about 7 mbps) provides responsive low bit rate editing of HD material on a laptop. It can also be used to maximize the amount of material that can be stored when editing long-form projects. Using the offline codec, an editor can cut on any PC and then conform the full-resolution HD files on a Matrox Axio NLE. The size and aspect ratio are corrected and effects are properly translated. Any effects that have been accelerated by Matrox are converted to real-time Axio effects instead of non-real-time Premiere Pro effects. Another alternative to uncompressed HD is the high-quality compressed MPEG-2 I-frame HD mastering codec (50-300 mbps). Since codecs can be mixed, graphics and animation can stay uncompressed and be mixed with the compressed video in the same real-time sequence.

Color correction and titles are a big rendering bottleneck on other systems. For example, if you do a one-hour show with transitions, full color correction, numerous lower-thirds and a station bug throughout, software NLEs will require a lengthy render before you are ready for tape or air. If you are on a tight deadline, Axio is hard to beat; in this example, probably every-

thing would be real time. Cut the show and go to air.

## THE EFFECTS TOOLSET

Matrox has concentrated on most of the basic tools for powerful features in Axio 1.0, with more to come in future versions. To start, there's a killer real-time DVE that not only does the basic moves but lets you curve the edges, add soft borders and even apply surface finishes. These finishes include the texture of bricks, wood and other materials, plus lighting effects and an edge extrusion. Rounding this tool out are great looking page curls, shadows and masks.

Flashy DVE effects are pretty cool in demos, and they are certainly essential on any NLE, but I find real-time blurs, keying and color correction more useful in tasteful compositing. Blurs in particular are often used for glowing the highlights in an image; competing products usually require blur effects to be rendered. Axio's chroma keying capabilities are some of the best I've seen on an NLE that didn't rely on Ultimatte or Primatte. The sample plot uses a windowed area instead of the more common eyedrop-per tool, which lets you grab a large patch

of your green or blue background color and average across that sample area to adjust for an uneven, poorly lit background.

Matrox Axio includes both real-time primary and secondary color correction. The primary color corrector provides basic proc amp control, three-way color correction (complete with master, shadows, mid-tones and highlights control) and input/output level control, while secondary offers all the controls found in the primary color-correction filter with the added capability of limiting the effect to a specific range of pixels. Pixels may be selected using color and/or brightness.

The primary and secondary color correctors are of Matrox's own design. Although they work well, they don't include all of the tools in the standard, software-based Premiere Pro plug-in. For instance, there are no curves. I'd love to see an Axio-accelerated version of Synthetic Aperture's Color Finesse, a highly regarded color-correction filter included with After Effects. These comments notwithstanding, Axio's primary and secondary correction tools are more than adequate to do some really artistic work on any show. The fact that you get two levels of correction running in real time with 10-bit high-defini-

tion footage is way ahead of many more expensive NLEs.

### OBSERVATIONS

There were a number of other nice touches in Axio. For example, the breakout box includes a built-in 1394 (FireWire) connection. The HD unit has RGB/YpPr analog monitor connections so less expensive video monitors can be used. It also has four pairs of AES outputs, which can be mapped in software to match a 5.1 speaker placement. (Premiere Pro supports surround mixing.) The media mixing is impressive. I was able to chroma key a PAL image (25fps interlaced) over a

1080p 24fps background and Axio correctly adjusted the frame rate. It had to be rendered, of course, but the PAL clip stayed in sync.

Axio indicates that rendering is necessary by a red bar that pops up over the timeline in the section that exceeds the system's real-time capabilities. Axio will always attempt to play these sections by dropping frames to maintain sync. You can then render selected sections or the entire timeline. It's interesting to monitor the Windows Task Manager when playing a sequence. The load to the processors (four, in the case of the AMD machine) is balanced evenly; spikes to the 100 percent

mark indicate sections that will require rendering.

I worked with a test unit for the better part of a day without a crash; it's apparent that Matrox put a priority on shipping a very stable product. This was an HP 9300 with the dual-core AMDs, which indeed exceeded the specs. In fact, I had to pile on quite a few effects to force a need to render. Adobe has made great strides in turning Premiere Pro into an NLE that's truly ready for primetime; Matrox Axio provides the level of hardware sophistication required by broadcasters and post facilities to turn that primetime wish into reality. ▼