

# Matrox CompressHD Test Drive

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digital  
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Film and Video Production in a Multi-Platform World

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**A** funny thing happened on the way to this installment of Affordable HD. Psyched by the arrival of the outstanding liquid-cooled HP Z800, I had scheduled a review of Matrox's hot, new H.264 co-processor board, CompressHD, figuring if the card could outperform HP's 3.2GHz dual-processor, quad-core Intel Nehalem-based system, it was really something. Unfortunately, as sometimes happens in this business, Matrox's delivery of the brand-new Windows-based drivers slipped. So, I had to console myself testing a beta sample of Matrox's upcoming 1.6 Macintosh-compatible CompressHD release on my 2.93GHz dual-processor, quad-core Nehalem-based Mac Pro system.

By way of background, CompressHD costs \$495 and is based upon a chip from ASIC vendor Ambarella. Matrox started shipping CompressHD for the Mac soon after NAB Show 2009, but version 1.6 of the software debuts support for Apple Final Cut Pro 7 and Compressor 3.5. Matrox also updated the internal operation to maximize overall compressed quality and changed how you work with the card in Compressor.

In my tests, CompressHD performed much faster than Compressor 3.5, delivered superior H.264 quality and output HD H.264 footage compatible with Blu-ray authoring for both Apple and Adobe Encore CS4, though not at first. De-interlacing quality, which is critical when working with interlaced source footage, was very good.

The only real negative was the inability to insert keyframes at scene changes, which only impacted one of about 42 scene changes in my standard test file, and then only for three



or four frames. Overall, if you're relying on Compressor for your encoding chores today, CompressHD should be able to improve your video quality (or streaming data rate) and save you time.

## Overview

When you install CompressHD, Matrox loads six folders of CompressHD-specific functions into Compressor—Apple Devices, Blu-ray, Flash, Other Workflows, Sony PSP, and YouTube—which operate just like regular Compressor presets. You apply them by dragging them into the batch window, you can modify them in the Inspector window, and you can save custom presets. Unlike with previous versions of CompressHD, you don't have to disable CompressHD to encode using a Compressor template. When you apply a Compressor template, Compressor uses the Apple codec; when you apply a Matrox template, Compressor uses CompressHD.



Figure 1. Matrox CompressHD templates in Apple Compressor's settings window.

If you have a multiple-core computer set up as a cluster via Apple Qmaster, do not send the CompressHD job to the cluster; send it to the single computer. You can setup multiple-machine clusters with CompressHD, but each needs a separate CompressHD card.

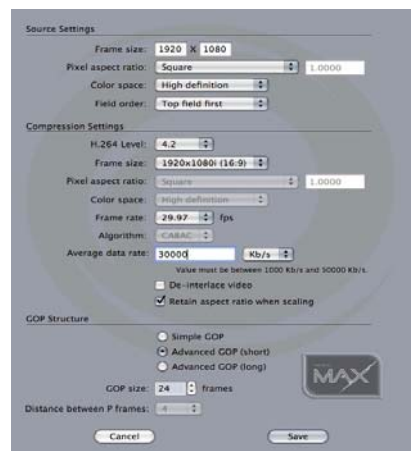


Figure 2. A CompressHD Blu-ray template.

CompressHD has two types of templates with slightly different interfaces: one for Blu-ray, and the other for all other files. The Blu-ray template is video-only, and you use existing Compressor Dolby Digital templates for audio. Blu-ray encoding is generally straightforward, with the option to use context-adaptive binary arithmetic coding (CABAC) entropy encoding, which should increase compressed video quality and isn't an option when producing H.264 with Compressor.

The only confusing bit is the option to use Simple GOP, Advanced GOP (short), and Advanced GOP (long). At Matrox's advice, for the broadest compatibility, I used Simple GOP for all encoding, which is different from the default setting of many templates. Keep this in mind if you encounter difficulties with Blu-ray compatibility in the field.

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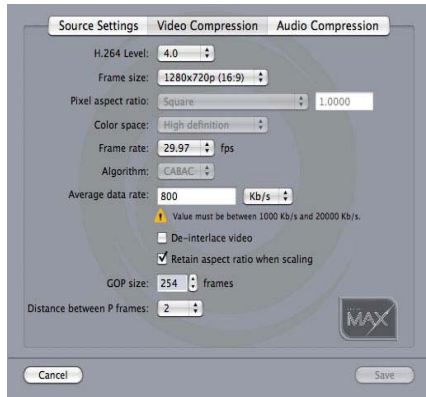


Figure 3. My data rate is too low for this H.264 level, so CompressHD won't let me save the preset.

CompressHD's general encoding template has three tabs: one to specify the settings of your source file, one for video parameters, and one for audio. The encoder produces using the Main profile and monitors compliance with H.264 levels, and it will prevent you from encoding if your parameters exceed the spec.

This is ideal for devices, but probably not necessary for computers since the QuickTime, Flash, and Silverlight Players can play any level of the Main profile. Telestream Episode Encoder Pro takes a better approach, and it will automatically increase the level if other encoding parameters, such as resolution or data rate, exceed the then specified level. As a practical matter, CompressHD prevented me from encoding my comparative files at 1280x720p@800kbps, since the data rate was too low at level 4 and the resolution too high at level 3. I've produced using these parameters for more than two years and have never had a prob-

lem producing in other encoders or playing the files back in any player.

You can produce at any even-number resolution at 64x64 and higher. On the other hand, the release that I tested wouldn't allow a GOP size of 300—any setting over 254 jumped the GOP size to 2048, which is too high. I also couldn't set my target B-frame interval to my standard 3, as 1, 2, 5, 10, and 25 were my only options. Given the performance and quality, none of these are major options, just rough edges to be smoothed in the next release.

More seriously, CompressHD only operates in single-pass encoding mode and doesn't have the ability to add keyframes at scene changes, a quality-enhancing feature supported by Compressor and most other encoding tools. As you'll see, at some extreme scene changes, this resulted in a multiple frames of ugly video, and is a deficit that Matrox should resolve as soon as possible.

## Performance

I encoded three files with both CompressHD and Compressor. One was a 1-minute 1080i ProRes file to Blu-ray at 30Mbps, the next a 5.5 minute file to 640x480 at 500kbps (468kbps video/32kbps audio), and one at 720p to 1128kbps (1Mbps video/128kbps audio). I sent all Compressor encodes to an eight-instance Qmaster cluster on my 2.93GHz dual-processor, quad-core Mac Pro. Though I recommend multi-pass encoding in Compressor for optimal quality, some producers use single-pass encoding for draft work, so I included those times as well.

As you can see in the table, CompressHD was always much faster than single-pass. In the SD encode, CompressHD was about twice as fast as Compressor in single-pass encoding and was just less than four times faster in multipass mode. In HD mode, CompressHD was more than three times faster than single-pass, and about 6.5 times faster than multipass.

## Quality

While faster encoding is always good, quality is what truly matters at the end of the day. To assess this, I compared Matrox's single-pass encoding quality against Apple's multipass encoding. Here, Matrox easily outperformed Compressor in both SD and HD trials. You can see the clear difference in SD quality in Figure 4, with Compressor on the left and CompressHD on the right.



Figure 4. At these demanding encoding parameters, Matrox CompressHD (right) easily outperformed Apple Compressor (left).

The one fly in the ointment was poor quality at one very dramatic scene change, as shown in Figure 5, which is the first frame of a new scene. On the left, the image produced by Compressor is relatively clear; on the right, the image produced by CompressHD is distorted, and remains so for several frames. This is a particularly dramatic scene change from a Taekwondo dojo with very low

	Apple Compressor		Matrox CompressHD
	Multipass	Single-pass	
1 minute to Blu-ray@30Mbps (min:sec)	5:15	3:35	1:14
SD: 5.5 minutes to 640x480@500kbps total (min: sec)	10:50	3:42	2:43
HD: 1:40 to 720p@1128kbps total (min:sec)	15:07	7:37	2:21

Table 1. Encoding results with Compressor and CompressHD.

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Figure 5. CompressHD (shown on the right) didn't insert keyframes at scene changes, which created problems with this scene change.

levels of detail to a scene with extreme detail, and was the only one of 42 scene changes in my test clip that triggered this reaction. It's unlikely that you'll see this reaction in most normal scene changes, but, as mentioned, it's a deficit that Matrox needs to address.

In my HD trials, the quality difference between the two was less noticeable, but CompressHD produced superior saturation and contrast, without the faded look you see in the Compressor image on the right in Figure 6. I didn't compare Blu-ray quality because at those high data rates, it's impossible to tell the difference.



Figure 6. On the left, CompressHD delivered better detail with better color saturation and no fading.

Just to save myself some hate mail, I should note that this doesn't mean that Compressor can't output high-quality video. Rather, it means that

at extremely aggressive data rates, CompressHD and many other H.264 encoding tools will produce superior output.

## De-interlacing Quality

De-interlacing quality is essential to all producers working with interlaced video, and CompressHD proved very competitive in my comparisons with Compressor. As most readers know, Compressor offers three de-interlacing modes: Fast, Better, and Best. The time difference between Fast and Better isn't that significant, so few users use Fast.

Best uses a technology called Optical Flow from Apple Shake, and it's very aptly named, offering exceptionally high quality. Unfortunately, it's too slow for most real productions, since it can extend encoding times by a factor of 40X-50X. As a practical matter, Better is the most apt comparison between Compressor and any other encoder.

In my tests, CompressHD was slightly behind Compressor's Best quality, and on par with Better. Basically, if you're working with interlaced source footage, CompressHD should deliver very good-quality progressive streaming footage.

## Blu-ray Output

If you read Matrox's user boards, you've probably noted that CompressHD has had issues producing Blu-ray footage compatible with Adobe Encore, and obviously, any Mac H.264 encoding tool needs to output video compatible with Final Cut



Figure 7. Apple Compressor Better and Best on the left and in the center, respectively; Matrox CompressHD on the right.

Pro 7 and Compressor 3.5's Blu-ray authoring. I was pretty psyched to test both functions, but my first encoding run, at 30Mbps, wouldn't work with either Encore or Final Cut Pro 7.

I queried my Matrox contact, who confirmed that the old bug that hindered operation with Encore had crept back into the software. He mentioned it was a "header" issue and advised me to try encoding at 15Mbps, which I did, and it worked in both programs. In closing, he promised that the final release will have this fixed.



Figure 8. Footage encoded with CompressHD successfully imported into Encore, albeit at 15Mbps.

Deadlines being deadlines, I had to hand this in without testing the final release, but I will do so when it's available and will ask millimeter's already overworked staff to update the story. Overall, quickly producing high-quality H.264 video will become increasingly critical to most producers over the next few years, and CompressHD looks like a great tool for the job. ●

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