

Post

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FILM SCANNING

By Claudia Kienzle



Arri's Arriscan can scan roughly one frame per second. 6K x 4K scanning is about four seconds per frame.

Scanners that capture film's rich picture and color information for processing in the digital domain, and recorders that record that data back out to film, are critical to providing superior digital intermediate finishing.

Recognizing the need for DI houses to produce pristine images in very tight timeframes, vendors say their next-generation scanners and recorders have reached new benchmarks for quality and speed.

SCANNERS

GRASS VALLEY GROUP

"With respect to film scanners, there are three main differentiators: scanning speed, resolution quality and image stabilization," says Michael Schneider, GVG (www.thomson.net/) marketing manager for EMEA (Europe, the Middle East and Africa), based in Weiterstadt, Germany. "I encourage buyers to take a piece of film with which they are familiar and have it scanned on different brands of scanners to compare the results."

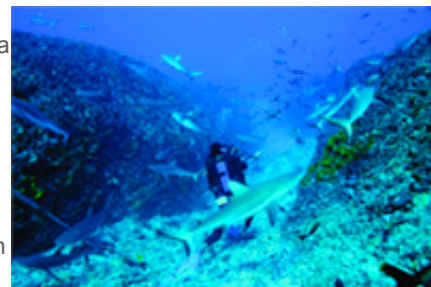
"With prices in the \$100,000 to \$300,000 range, slow-speed scanners employ pin registration to steady each film frame before scanning it, making them ideal for complex visual effects, layering and compositing jobs. Thus, throughput in slow-speed scanners is limited as they scan at roughly one frame per second," says Schneider. "High-speed scanners, starting around one million dollars, are capable of scanning 4K film in near-realtime and 2K resolution film in realtime, making them ideal when speed and productivity are issues, without sacrificing quality."

The Grass Valley Spirit 4K (a high-speed scanner) provides 16-bit signal processing, with 4K resolution scanning at 7.5 frames per second. The Spirit 4K can scan 2K resolution in realtime (24 or 25 frames per second), or faster depending upon the speed of the disk array storing the images.

The new Spirit 2K scans 2K resolution in 10-bit, at a realtime transfer rate, and can be upgraded to a Spirit 4K by Grass Valley engineers in the field. Either can be configured for data or video output, or both.

The Spirit 4K and 2K are based upon a new design architecture, exclusively leveraging the Kodak Advanced Imaging Subsystem with customized optics for 16mm and for 35mm. For image stabilization, Grass Valley offers Bones Stabilizer software, which can be used downstream on the same Linux server platform that stores image data from the film transfer.

Schneider says 21 Spirit 4Ks have been installed worldwide, including FrameStore and Clear in London; Duboi in France; and Laser Pacific, Warner Bros. and Modern Videofilm in Hollywood. And they've been used to scan many major motion pictures, including *The Hitchhiker's Guide to the Galaxy* and *The Aviator*.



The IMAX film *Sharks 3D* was recorded to a Celco Fury. The unit can record to the IMAX format at a rate of eight seconds per frame.

FILMLIGHT

While FilmLight is only three years old, the company's Northlight film scanner has met with success. "At first, we estimated the universe of high-end film scanners to be less than 100 units worldwide. But that simply isn't true today," says Peter Stothart, commercial director for UK-based FilmLight (www.filmlight.ltd.uk/). "With the explosive growth of the DI market, and demand for high-end scanners dramatically increasing, we've already sold over 30 scanners in a short period of time. Facilities are buying scanners today that they wouldn't have considered buying years ago largely to jump into the DI market."



Northlight V.2.0, due to ship by year's end, will feature new sensor technology, optics, pin registration and electronics, resulting in an increase in scanning speed by a factor of four to six times. It's faster than two frames per second at 2K and one frame per second at 4K resolution. "Northlight actually scans at 6K in one scanning pass, then outputs the resolution you need," adds Stothart. "CCD scanners like ours use very high light levels to capture the true depth and dynamic range of film to get the best out of the negatives without introducing noise."

Northlight V.1.1 has been used to scan such motion pictures as *Alexander*, *Alien vs. Predator*, *Bourne Supremacy*, *The Day After Tomorrow*, *Lemony Snicket's*, *Troy* and *Gothika*. Northlight customers include FrameStore CFC in London; ILM in San Rafael, CA; Cinesite in London;



Grass Valley's new Spirit 2K offers users a way to step up to the Spirit 4K, which was used to scan *The Aviator*, Lasergraphics looked to focus groups when designing the P3 film recorder, which accepts SD to 4K resolutions.

Modern VideoFilm and Rhythm & Hues in LA; and Cinebyte Images in Toronto.

FilmLight recently announced a partnership with Kodak that would integrate FilmLight's TrueLight color management solution with Kodak's Display Manager color calibration software. TrueLight provides a realtime simulation of the entire workflow from digital data to final projected image so that the closest possible match can be realized when translating the color space of the digital domain with that of film.

CINTEL

"The main challenge for the DI process is tracking data, such as timecode, keycode and origination information â€" as it flows through the process," says Adam Welsh, managing director of Cintel (www.cintel.co.uk/) in the UK. "Cintel scanners are designed to insert this vital information into the 'header' of each image file so it can be tracked."

Cintel has two film scanners: the dataMill and the very new diTTo. The dataMill is capable of (10-bit log-calibrated) scanning 2K resolution at 15 frames per second and 4K resolution at 3.75 frames per second using an HSDL output stream, with optional pin registration. Welsh says, "The dataMill scans film at 2K, 3K and 4K resolutions from all film formats from Super 8mm to 65/70mm. It can also offer a 10-bit log-calibrated HD or SD output in realtime."

The diTTo, (previewed at NAB 2005 with a formal launch planned for IBC 2005), is a pin-registered, three-color light source frame array scanner with a simple Windows-based GUI and buffer storage (for \$300,000). It scans 4K images at four frames per second in (10-bit log) DPX file images, stored on buffer storage or straight into a SAN.

Welsh says, "diTTo's high precision mechanics ensure that scans from all diTTo's match each other, with repeatable results, enabling several units to be utilized for a single project effectively."



ALT supports the price-conscious market

AXBERRY

Oxberry's Cinescan 6400, with a 2D CCD array, can be configured as 35mm/65mm (or 70mm) or 35mm/16mm, for 2K, 3K or 4K scanning. The Cinescan 6400 scans 4K film at five seconds per frame; and 2K at under two seconds per frame.

"Our design philosophy is that parts dedicated to film control, film movement and optics will probably serve us until the end of film, while the CCD and computer technology will evolve," says Dr. Alfred Thumim, president and owner of Oxberry (www.oxberry.com/), in Carlstadt, NJ. "Since our scanners have a modular design, even units we sold 10 years ago can be upgraded with the latest CCD and computer component to maximize the original investment."

The Cinescan 6400 can zoom in on any part of the film frame for blow-up of that aspect. Thumim says, "It can be done optically by zooming in with full resolution, as well as panning and rotating the image to straighten it out... with no loss of resolution or aliasing."

The Oxberry Cinescan 6400, which was used in the film restoration of *Carousel* by Cineric in NYC, offers a liquid gate for gentle film handling, mitigating scratches and dust, and supports every film format, including 4-perf, 3-perf, 28mm film and 46mm film, and even "shrunk film." Oxberry doesn't make a film recorder, but manufactures some of the cameras used by Celco and Lasergraphics in their film recorders.



IMAGICA

In 1999, Imagica's Imager XE scanner scanned 2K film at four seconds per frame and 4K film at 11 seconds per frame. However, today, Imagica's Imager XE Advanced Plus digital film scanner now scans 4K film at 1.9 seconds per frame and 2K film at 1.3 seconds per frame.

"Our Imager XE Advanced Plus captures richer picture and color information, and pin registration ensures that each frame will be scanned with rock solid steadiness," says Koji Ichihashi, president/CEO of LA-based Imagica Corporation of America (www.imagica-la.com/). "After film dailies have been transferred on high-end telecines, facilities can re-scan the selected frames [from the EDL] using our film scanner â€" so telecines and scanners are complementary."

At IBC 2005, Imagica will introduce the Imager HSX high-speed scanner, which scans at rates comparable to the Imager XE Advanced Plus. But, when used in conjunction with Kodak Digital ICE technology, the Imager HSX detects scratches and dust on film surfaces, and corrects many artifacts automatically.

Imagica, known for its film scanning products like the HSX, now offers a film recorder via the HSR, which records 2K film data to Kodak 5242 intermediate film for DI or interneqative films.

Among the movies that were scanned using the Imager XE Advanced film scanner are *Ocean's 12*, *Finding Neverland*, *Spider-Man 2* and *National Treasure*.

ARRI

"DI houses need to handle a huge volume of scanning and recording that would have been considered overwhelming a few years ago," says Richard Antley, product manager, digital imaging systems, of Arri, Inc. (www.arri.com/) in Burbank. "Because of the ground-breaking technologies we've employed, our new Arriscan will be a strong competitor in the market for scanning films for DI, visual effects and data-based post."

The heart of the Arriscan is composed of a 3K x 2K CMOS area array sensor mounted on a precision micro positioning device for scanning roughly one frame per second; with 6K x 4K scanning at about four seconds per frame. With Speed Pack 1, an upgrade to be released in September 2005, 3K x 2K will scan at four frames per second; 6K x 4K will scan at one frame per second.

"Illumination is provided by an array of red, green and blue LEDs, which have significant advantages over the broad spectrum lamps used in many other scanners. LEDs have a very long life [years as compared to a few thousand hours], are very stable and are precisely controlled through a closed-loop feedback system," says Antley. Among its nine installations to date worldwide, the Arriscan is in use at Weta Digital in New Zealand, scanning material for the upcoming remake of *King Kong*.



The Oxberry Cinescan 6400 scans 4K film at five seconds per frame, and 2K at under two seconds per frame.

FILM RECORDERS

LASERGRAPHICS

"Before we began designing the Lasergraphics Producer 3 [P3] film recorder, we held focus groups with top film professionals who described the film recording process in these words: 'managed only by highly-paid specialists; difficult-to-learn scripting languages; integration issues; steep learning curves; unpredictable results; and expensive,'" says Steve Klenk, VP, marketing and sales, for Lasergraphics (www.lasergraphics.com/) in Irvine, CA.

"We used that feedback to bring to market a film recorder that answered all of those concerns, plus offered QuickTime-direct-to-film recording that eliminates image file conversions, saving 50 to 100 hours of work per feature film," adds Klenk. "Also, we can record images directly to print film, saving 50 to 80 percent of the costs of traditional processing, at speeds of roughly 0.7 second per frame, and at half the price of the competition."

According to Dr. Stefan Demetrescu, Lasergraphics senior VP of R&D, "Customers don't want to base their business on 'experimental' technology or waste valuable time on maintenance. They told us that laser recorders require frequent adjustment and maintenance. So we chose to base our film recorders on CRTs, which typically require service once every few years." The P3 accepts any resolution from SD to 4K, upsamples SD to HD on the fly, and outputs HD to full-density 4K.

Since 1999, Lasergraphics has seen a 60 percent increase in sales, with installations at Digital Film Group in Vancouver; PostWorks in New York; and Matchframe and Ascent Media in Burbank. Motion pictures filmed out on a Lasergraphics recorder include *I, Robot*, *The Day After Tomorrow* and *Troy*. Klenk adds, "We also offer an integrated color management system that predicts how print film will appear when projected in the theater before the negative is ever recorded."

CELCO

"Because our DI customers are concerned with handling high volumes of film recording, in very tight timeframes, we designed two next-generation film recorders: Fury and Firestorm," says John Constantine, director of marketing for Celco (www.celco.com/) in Rancho Cucamonga, CA.

The Fury records 35mm film in roughly one frame per second and 65mm 15-perf IMAX film in eight seconds per frame. "There are two stereoscopic 3D IMAX films in theaters today, *Aliens of the Deep* by James Cameron and *Sharks 3D* by 3D Entertainment &€" both were recorded using the new Fury," Constantine says. The Firestorm has a slower processing speed than Fury and serves as an affordable, entry-level product.

Most DI customers, such as Post Logic and TCS in Hollywood, are using the high performance Fury, and often operate more than one unit as higher volumes of digital film are required for the DI process.

Post Logic used the Fury to record *Hotel Rwanda* and Constantine says while the post began using traditional film optical processes, "once they saw the look Post Logic achieved in the digital color timing suite for the digital master, they decided to shoot out a new negative using the digitally color graded version."

Fury can record onto nearly any camera negative, intermediate color or B&W film stock. Kodak 2242 intermediate film stock is the most popular choice for DI because it has virtually no grain. "This film stock requires a higher degree of light to expose it, and the Fury was designed to do this at a very high-speed with precision," Constantine says.

Celco recently introduced its Film Out Pro Graphical User Interface software for controlling the film recorder and the DCP (Digital Chemical Process) color imaging tool that ensures that colors set in the color grading suite translate accurately to film.

ARRI

"Since introducing the Arrilaser film recorder in July 1999, there are nearly 160 Arrilaser systems installed worldwide, which use this recorder for DI, film archival, visual effects and video-to-film transfers," says Arri product manager Richard Antley.

"The Arrilaser offers superior image quality and speed for recording the full dynamic density range on intermediate film stocks," adds Antley. The system can be configured to fit the end users' imaging needs and budgets, including native support for HD resolution images, 5245 camera negative stock, color management and a graphical configuration editor. "We also offer color management solutions, which we see as a critical enabling technology for users of our DI products," adds Antley. "Arri Color Management is offered for Arrilaser and houses using digital color grading solutions, such as Autodesk Lustre, Quantel iQ, da Vinci Resolve, Digital Vision's Nucoda, Iridas FrameCycler and the DVS Clipster."

IMAGICA

At NAB, Imagica introduced its first film recorder – the Imager HSR high-speed film recorder – which records 2K resolution film data to Eastman Kodak 5242 intermediate film for digital interpositive or internegative films. This film recorder leverages recorder technology licensed from Eastman Kodak Company and combines a new optical engine with JVC's D-ILA LCOS image device and LED illumination light source.

As a final note, most of these vendors wanted to stress that they've added tools for color grading and management to ensure accurate results as filmed images move between the different color spaces of the film and digital worlds.