

Trial by Jury

The verdict is in. With the debut of *Law & Order: Trial by Jury*, the producers and post team on the show have been found guilty of ushering in the future of television post. Set to debut in March, Wolf Films new series has put a big stake in the ground as the first TV show to post and finish entirely in data. The look is spectacular. The resulting data master can dub to any and all formats and aspect ratios for future distribution. The archival elements are future-proofed. And production doesn't cost a dime more. In fact, *Law & Order* co-Executive Producer Arthur Forney believes the show is saving around \$15,000 per episode.



How is all this possible? To understand the sweet irony of what *Law & Order: Trial by Jury* is accomplishing, take a trip back in time to 1989, when Dick Wolf debuted *Law & Order* as a pilot. He broke ground with the show's cinema verité look, shot with a handheld

16mm camera. "It was way ahead of its time," recalls Forney, who oversees the majority of all post-production for

Law & Order: Trial by Jury is the first show to shoot 16 and finish in data.

Wolf Films. "He wanted it to be as if the third person was the camera." That pilot didn't sell for one and a half years. And when it did, the logistics and aesthetics of prime-time TV forced the show to go 35mm, still the gold standard for prime-time episodics.



Puts New *Law & Order* in Post

Prime-time Series Moves to a 16mm/Data Pipeline

By Debra Kaufman



In 2005, Wolf has come full circle. *Law & Order: Trial By Jury* is shot in 16mm by cinematographer John Thomas (*Sex and the City*, *The Job*). Kodak's greatly improved Vision2 16mm stocks (7217 and 7218) are part of what's enabled the return to 16mm. But the engine behind the shift is a dramatic change in post-production at Foto-Kem, where staff has figured out a way to turn the budget-starved, deadline-frenzied process of TV post into a futuristic data hive.

Foto-Kem Senior VP of Digital and Data Development Rand Gladden, who has worked with Wolf Films since 1986 and was involved in post producing the original *Law & Order* pilot in 1989 (at The Post Group), was keen to make the post process more efficient. "We've all been thinking about providing higher levels of quality in a way the customer can afford," he says. "The key is always cost. The cost of doing post is high, and production companies remain under constant pressure to reduce costs." Post is usually the first place they look.

The idea took life during a typical

Above, from far left: the raw 16mm scan image from *Law & Order: Trial by Jury* with proper framelines exposed (1.66:1 aspect ratio); the daily (at 1.78:1); the final after Foto-Kem's 2K digital intermediate process.

Hollywood lunch, after Gladden had given Forney a demo of Foto-Kem's 2K digital intermediate process. Over the meal, he suggested that Forney shoot

Law & Order in 16mm and do a high-res post. "I said, 'I wish we could, but we can't afford it,'" says Forney, but Gladden talked to his staff, including



Senior longform colorist Bill Admans working with 2K data in real time on the Avid DS Nitris.

CTO Paul Chapman and senior long-form colorist Bill Admans, worked the numbers, and presented Forney with a post process that costs \$1800 an episode more than the normal HD fin-

ishing costs — but promises to save much more in production.

Tests followed. According to *Trial by Jury* producer Barry Berg, they went on the set of other *Law & Order* shows,

placing a 16mm camera next to their 35mm camera, which enabled them to compare the two formats side-by-side.

According to Forney, the network wasn't happy about the idea of a 16mm shoot — until they saw the side-by-side comparisons in high def and standard def on monitors and saw that 16mm footage color-corrected at 2K wouldn't compromise quality. "The split-screen test convinced them," Berg reports. *Law & Order* producers also had the benefit of some past experience producing in 16, for the last season of *Dragnet*. "We were extremely pleased with the results of the 16mm on that show," says Berg. "So it wasn't entirely new to us."

With the quality of the look ensured, the network warmed to the financial and other advantages of posting and finishing in data. "The biggest advantage of all this has been financial," says Forney. "You'd rather have the quality on the screen than spend it on equipment and stock. We're still going through the same process of telecine, online, color-correction, titling and format. But it's the same quality for less money — and that's a big deal. You don't lose any quality at all when you're working in a 2K world."

The Process

Recreating a typical TV post process in the data world has posed challenges for Foto-Kem, beginning with dailies. The dailies colorist scans 2K linear files via a Spirit telecine, which Foto-Kem has modified with a GSN card and some homegrown software to scan 2K at real time, onto the facility's Bright Systems SAN network. "We're getting the 1.66 frame, from which we can extract all the various formats that might be required in the future," says Chapman. "We're capturing more resolution, more color on the negative, and greater exposure range."

Scanning at 2K in real time is, obviously, a good thing, but Foto-Kem engineers scratched their heads over how to sync sound in a data-centric environment. Their solution was a software system integrated with the SAN storage to capture the sound timecode during the telecine data scan. The operator can now automatically sync sound to picture in the sync room. "Otherwise, we'd have to

▶ Shooting 16mm, Saving Money



Trial by Jury producer Barry Berg (left) and cinematographer John Thomas.

Jessica Burnstein

Shooting 16mm for *Law & Order: Trial By Jury* has had more than one upside. First, a no-brainer — reduced costs. "16mm stock is cheaper and camera equipment is cheaper," says *L&O* co-Executive Producer Arthur Forney, who reports that the production is saving approximately \$15,000 to \$20,000 per episode.

Cinematographer John Thomas, who shot five seasons of *Sex and the City* and two seasons of *The Job* in Super 16, brings experience specific to that format to the set. He's using three ARRI SR-3s from Panavision (Camera C is used for back-up and Steadicam) outfitted with a range of Canon zooms and Zeiss primes. Film stock is Eastman Kodak's 7217 and 7218. Thomas recalls that the 500-speed 7218 came out when he was shooting *Sex and the City*. "It was an obvious improvement for us from other stocks," he says. "Finer grain, but also slightly less contrast, which helped us."

Moving to 16mm has also had a positive impact on the logistics of production. Thomas points out that the 800-foot magazines run 20 minutes and are faster to reload than 35mm magazines. *Trial by Jury* doesn't use a lot of handheld and Steadicam shots, but *Trial by Jury* producer Barry Berg notes the advantages of smaller and lighter gear. "Because it's lighter, it is physically less taxing on those who have to schlep the camera around, which certainly accounts for something." The result, offers Berg, is that he does feel that "the nature of the cameras seems to help us in getting through a rather ambitious workload each day."

From the set of the eighth episode, Thomas says the look of the show is evolving. "Every director brings a little something and we're learning what works for us and our storytelling," he says. "One thing we have with 16mm is a greater depth of field. Sometimes we fight it by using longer lenses, which helps keep the background out of focus. Sometimes it adds something and we're definitely not fighting it."

The producers send Thomas a DVD from Foto-Kem, letting him keep tabs on the show's look as it goes through the post process. "Ten years ago, you could really tell a 16mm show," Thomas concludes. "Some of the negative is a little more grainy, but Kodak and Foto-Kem have worked together to make that disappear." Producer Berg agrees. "People tend to think about 16mm the way it was 15 years ago," he says, "and it just isn't so. The new stocks are amazing. I'm not saying 16mm is right for everything, but it is something people should consider. 16mm seems to be a good tool for TV."



Foto-Kem senior colorist Kostas Theodosiou oversees *Trial By Jury's* color-correction specs.

manually find the clap on every take, which is potentially a big time loss," Chapman says. "This speeds up the entire process for dailies and also gives us more flexibility. If we have any problem with slates, we're now working in a non-linear environment and can manually sync shots faster than in a telecine bay because we're not dealing with tape shuttling back and forth."

NBC has a highly secure internal network for distributing previews in standard definition based on Windows Media 9. Foto-Kem encodes the dailies to Windows Media 9 and sends them to NBC via its fiber connection, giving the network instant access to the dailies. Foto-Kem also outputs an HD D5 tape of the dailies and digitizes the material for the client's standard-def Avid Adrenaline offline system.

Foto-Kem senior colorist Kostas Theodosiou, who oversees the project's color-correction specs, does the color grading on the modified Spirit with a DaVinci 2K secondary color-corrector. With the scan in 10-bit RGB uncompressed form, the full-bandwidth, full-resolution (2048x1240) footage is a much richer canvas for creative and technical choices. Theodosiou notes that the nonlinear color-correction environment lets him easily mix and match shots, a creative leap beyond linear, tape-to-tape color correction. The full-bandwidth, full-resolution information enables him to reframe shots horizontally or vertically without losing resolution. Creating a zoom shot or pushing a boom out of

frame no longer carries a resolution penalty. "Another advantage is that you're not going on and off of tape so you don't have those resolution losses due to compression, going through D5 or HDCAM codecs and the changes in color space from YUV to RGB," he points out.

From the early tests performed in the Spirit suite, Theodosiou found that the grain structure that signals 16mm stock simply wasn't there, because of the high-res capture. Traditional grain reduction in HD or SD tends to blur the picture a bit and reduce sharpness, but Foto-Kem's 2K processing better interpolates and blends the grain, reducing it without reducing detail and therefore emulating a 35mm look. "And we're able to go into too-dark or too-white areas and pull detail out," he says. "If you have a blown-out window, we can still extract detail because of the additional resolution that's there."



The Spirit Datacine real-time 2K telecine is connected to Foto-Kem's SAN.

Gladden points out that, for tape output (delivering on regular HDCAM tape at 1080i), Foto-Kem works in video's linear color space. "But if someone wants to do a film-out or make a sprocketed archive element, we can convert the linear files to log files through software," he says. Switching the color-correction from HD to data took place in stages. Foto-Kem transitioned to working with 2K image files for final finishing at the beginning of February, and ramped up to offering it as a service closer to the beginning of March.

SAN Efficiency, sans Problems

The key efficiency in shifting to a data workflow has been the accessibility of the material on Foto-Kem's SAN. Gladden notes that although real-time 2K scanning has been available for some time, the ability to do that and share the resulting data with other workstations is a real breakthrough — especially for prime-time television. "We've truly created a nonlinear finishing process," says Gladden. "In the typical linear post environment, if you have a tape master and it's being cleaned, you're stuck in the cleaning process. Now, all of our media is always online after it goes to telecine. It enables us to do multiple things at the same time, which makes the process more efficient." In this nonlinear finishing workflow, points out Gladden, the same media is available for dirt removal, color-correction, visual effects and titling. As of now, this means they have two-read/one-write or two-write/one-read access. Gladden hopes that by



Foto-Kem's telecine bay with an HD CRT monitor and projection screen.

the end of the year, that will increase to three-read/three-write simultaneously. He estimates that the streamlined process saves as much as two days of post — but also points out that clients often used saved time to make more decisions and polish the show in post. “It’s relative,” says Gladden. “Productions tend to take the time they have.”

The system is, however, still evolving. Foto-Kem has been an important alpha and beta development site for the Avid Nitris version 7.6, which debuted this month. Avid Nitris senior product manager Matt Allard describes the major change represented by the latest version, which will allow the user to conform file-based data. “Changing from knowing where the tape is to where the file is was a big infrastructure change,” he says. “Doing a tape-based conform, you know how to control the VTR mechanism and find the timecode. Looking inside a file to extract data and keycode is a very different beast.”

Another big challenge in bringing the Avid Nitris up to speed for data was dealing with the huge amount of data generated by 2K scans and RGB files. Allard points out that Avid has actually been working on supporting file-based work in a phased approach, starting nearly two years ago. From the user’s point of view, little has changed. “For the editor, it will appear very akin to what we do with tape,” he says. “We’re applying the same process, but rather than pointing to tapes, the Avid Nitris points to files on disks. Foto-Kem is doing something quite exciting,” adds Allard. “Historically, the Nitris was not intended to do a film finish. And Foto-

Kem is essentially bringing a film DI process to television.”

Gladden believes that Foto-Kem will be full-speed ahead with a totally tapeless system by April, with multiple projects in the nonlinear production workflow pipeline.

In a tapeless future, the post facility can also play a role in distribution of assets — and Gladden is hopeful that Foto-Kem can offer its clients new options. “The last thing we’ll be able to add is the archiving and asset management piece,” he says. “Ultimately we’ll be creating data-centric assets. We’d like to electronically store, manage and distribute those resolution-independent assets.”

Savings, Savings, Savings

It would be logical to expect that a 2K nonlinear post-production process would cost the big bucks associated with high-res and real-time. But Gladden’s team created this nonlinear post system with TV’s time and budget constraints in mind. They built efficiencies into each part of the system, from the real-time 2K scan to making the material

available for multi-tasking. That’s how Foto-Kem has kept the costs down to \$1800 more than an HD finish, an expense compensated for by the savings of shooting in 16mm (see sidebar, “Shooting in 16mm.”).

Additional savings will accrue in the future, when every syndication deal or international sale won’t trigger another costly telecine session. Instead of a new session to reconform negative, re-color correct and add VFX and titles — which can cost up to \$30,000 to \$40,000 per episode, reports Gladden — the facility can simply pull out the universal data master and make a clone. “The data master is always available for the producers to create whatever master they want — even three-color separations,” says Gladden. “No matter what the tape format may be in the future, there’s now a high-res element available for them to extract a new version — for the cost of a dub.”

With the blurred line between TV movies and theatrical releases — HBO’s *Angels in America* comes to mind — the data master is a perfect source for a film-out of cinematic quality. “We can do that and deliver a correct aspect ratio,” says Gladden. “We can make one post-production path for both markets. By bringing all this added value to the finished asset, it gives studios more opportunity to get back-end value from their show.”

The data-centric, nonlinear post workflow is the logical progression of an industry that is evolving in that direction. “It’s complicated to do it — but the theory behind it is very simple,” says Gladden. “It helps the post-production process for the production company, the content owners and the post facility. It won’t be too long before the theatrical-release world will adopt this philosophy.”

From Forney’s point of view, the new workflow changes everything — and nothing. Nothing, because the show still goes through all the post-production processes it always has. And everything, because the show’s producers are freed to handheld 16mm for the first time since 1989. “We’re still discovering the process,” says Forney. “We haven’t figured it all out yet.” But the possibilities are tantalizing.

Post Team at Wolf Films

- **Co-Executive Producer:**
Arthur Forney
- **Co-Producers:**
Tim De Luca and Barry Berg
- **Editors:**
Charles Bornstein
Leon Ortiz-Gil
David Siegel
- **Assistant Editors:**
Felicia Livingston
Marilyn Adams