



**TO**

Dean Devlin, it's all straightforward: Episodic TV production not only should move toward all-digital production and acquisition, it must and it shall. From his perch as executive producer/writer/director on TNT's *Leverage*, Devlin is doing all he can to promote the notion that film—and if he has his way, videotape—should depart the TV production scene permanently. Now in its second season, *Leverage* is among the first hour-long dramas on American TV to be produced exclusively with an all-digital, tapeless workflow built on the foundation of the Red Digital Cinema Red One camera recording to hard drives, and it's the first to maintain an entire post-production infrastructure inhouse, adjacent to its stage.

“For me, it started around 2004, when Panavision introduced the Genesis camera,” Devlin says. “Suddenly, we weren't dealing with a medium trying to look as good as film—we were moving into a medium that was able to surpass film in a sense. That's when the whole world changed. Suddenly, we could produce image quality with the familiar look of film, but with more flexibility. For instance, with film, we had maybe a three-stop difference in post. Suddenly, we had a five-stop difference. In film, we could blow up our image maybe 10 percent before it would start to degrade.

## BY MICHAEL GOLDMAN

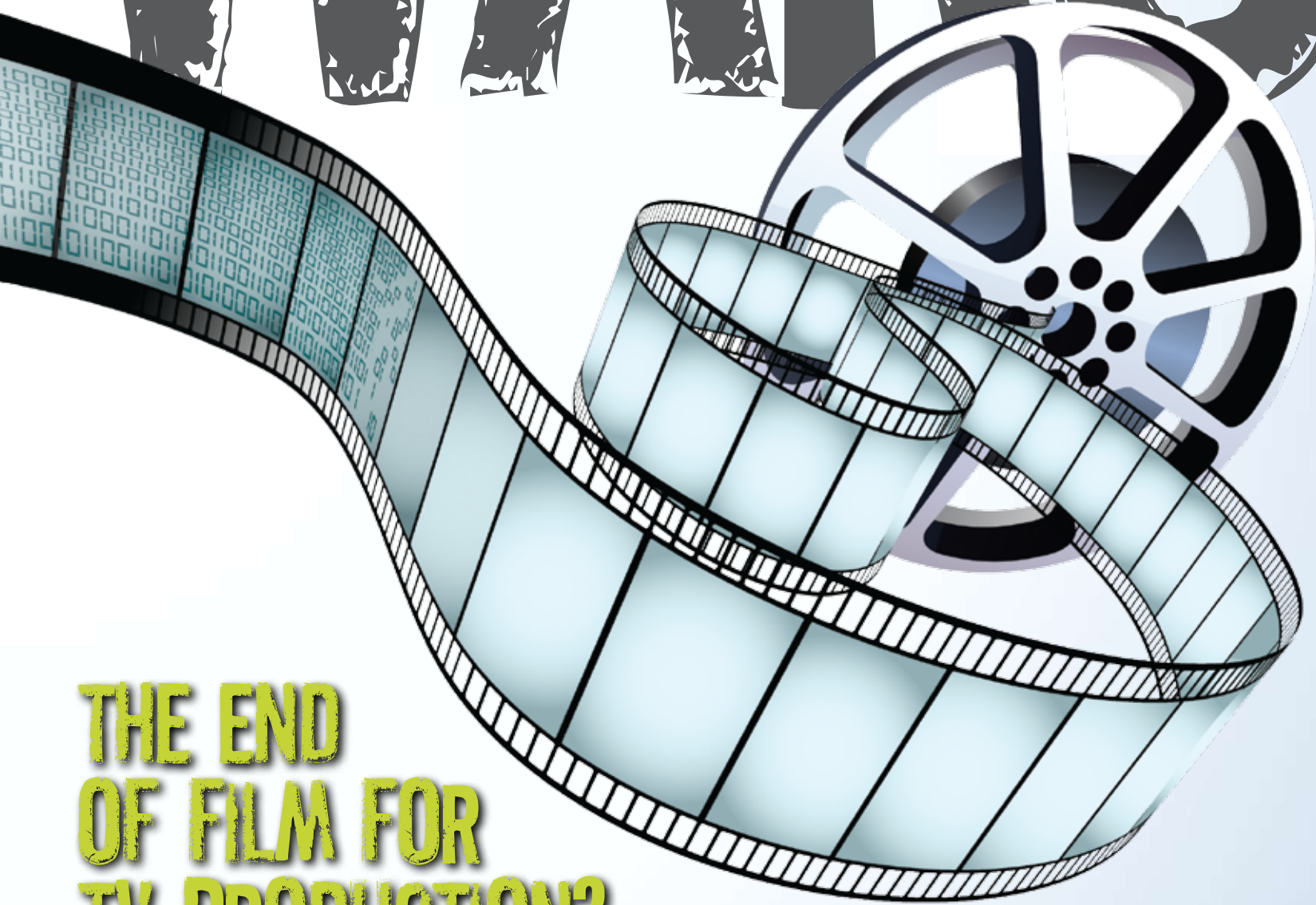
Suddenly, we could blow up our image 250 percent before it was degrading. It was a real game-changer. And now, with the Red workflow, we have a new pattern of working, where we don't have to wait to lock picture to start working on sound, or lock picture to start on color correction. We can work on things as we feel a need to creatively, and that is a big difference.”

Devlin reports extensive cost savings for the adventure drama over how the show would otherwise have to be made (see below), insists there have been very few technical hiccups, and claims the look and quality of the resulting imagery is very high-end. Many across the industry, of course, have other ideas. Some passionately oppose the idea that Devlin promulgates: that film's days are numbered as a primary acquisition format for all episodic TV.

They likewise disagree with him on the look and efficiency of digitally acquired imagery in an episodic TV workflow. They subscribe to the view of James Chressanthis, ASC, cinematographer for CBS' *Ghost Whisperer*. “Nobody has ever asked me to shoot digital because it looks better than film,” he says. In fact, Chressanthis helped fend off suggestions from CBS this year that *Ghost Whisperer* should switch to digital acquisition (see sidebar on p. 19).

# WAWARDS

**FORMAT**



**THE END  
OF FILM FOR  
TV PRODUCTION?**

Other DPs insist their shows have maintained their traditional, film-style look just fine while going digital. There are conflicting opinions on the subject across the industry. But caution about the transition to digital won't prevent it, according to Devlin.

"There is an expression: 'The Titanic hit the iceberg not because it didn't see it coming, but because it takes a long time to turn around a really big boat,'" Devlin says. "We have a big industry and a lot of vested interests, and it takes a long time to adapt, but the boat is turning. I don't think we will be doing much of anything on film very soon; most of the things that used to be the advantages of film are gone."

That is a provocative position, but one that lies at the heart of a sensitive debate in the industry. There is no question more shows than ever before are being made with digital cameras. Most pilots and, over the past year, a significant number of well-established, hit shows captured traditionally on film stock have transitioned to digital acquisition. Even the shows that haven't switched at least examined the proposition, primarily at the request—some would say insistence—of TV networks and production companies desperate to cut costs. It's a trend built around the idea that digital is both cheaper and ready for primetime.

While producers on some shows contacted by *millimeter* deny that switching to digital was mandated, they do concede that digital acquisition is being suggested as part of the general cost-cutting discussion. Like *Ghost Whisperer*, CBS' original *CSI: Crime Scene Investigation* and Fox's *24* recently researched transitioning to digital camera systems for



For Fox's *Bones*, which switched to digital acquisition this season, the production tethers the Steadicam rig to a backpack worn by an assistant. Inside the backpack is a Sony SR deck recording to HDCAM SR tape.

the upcoming season, but eventually opted to return as 35mm-acquired shows. The other two *CSI* programs (*CSI: Miami* and *CSI: NY*), however, have already switched—as have many Fox shows, with more on the way. The vast majority of new shows greenlit for the coming season by major broadcast or cable networks are starting life with digital cameras. A prominent exception, however, is HBO, which continues to prefer film acquisition for its programming.

Still, the adoption of digital camera systems such as Panavision's Genesis, Sony's F35 and F23 systems, Arri's Arriflex D-21, and the Red One system into the production of dramatic network television shows has become such an important issue that *millimeter* recently decided to survey a few television producers and

cinematographers about their experiences on these matters. As you will see, there is a general feeling that the industry is moving inexorably toward all-digital acquisition.

"This is really the season that will flesh it all out," says Marshall Adams, a cinematographer (along with Feliks Parnell) on *CSI: NY*. "It all depends on how things go this year with shows like ours, about whether or not producers of up-and-coming shows will lean toward digital acquisition going forward or fight to stay with film."

Following are excerpts from conversations with producers and DPs on shows directly affected by this trend—newer shows born digitally (TNT's *Leverage* and Syfy's *Warehouse 13*), and longtime hits currently starting their new digital workflow (Fox's *Bones*, CBS' *Medium*, and CBS' *CSI: NY*).

## What DPs think

**millimeter:** How did you decide what digital camera system to employ, what were your concerns about maintaining your show's look when switching to digital acquisition, and what were some of your solutions?

**Gordon Lonsdale, DP for *Bones*:** Visually, the look of *Bones* is a lot of color with rich contrast, and then the look changes with the mood and dramatic theme of each episode. People watching at home, I doubt they will notice the difference this season with [the Sony F35]. A bigger challenge for me was I also was asked to lower my lighting budget, and that requirement largely dictated the choice of the F35. I needed a camera that was very light-sensitive, and this camera does that.

I asked the producers if they wanted the look to change, and they did not. So, with the production designer, gaffer, and key grip, we implemented putting more lighting into the design of the set itself. We replaced some motion-picture lights with practical lights on the set, and we went to less expensive lights for outside the windows. On location, I was able to cut our lighting package drastically, adding a lot of smaller lights I could plug into walls that did not require a generator. I kept a few big lights, but we decided we could get the same lighting from the whole package if we didn't light as big an area. It was a challenge, but by examining how we lit the show, we were able to save money and still get nearly the same look.

To me, the properties of the F35 are close to film. If I let the camera have the most latitude possible for recording color imagery, shooting in [Cine Mode] and S-LOG, that gives me total control later on [in post]. I still have to light carefully on set, but in post, I can adjust color balance and the midranges to get more control over the image."

**Larry Reibman, DP for *Medium*:** We always knew there was a possibility they would want to switch to digital, and once we investigated it, our producers wanted to go for it. We all wanted to take up the challenge of making the show on HD and not letting the viewer know the difference. We looked at various camera systems and finally decided on the Genesis. For us, it was largely a hardware choice because we felt the image would be good with Genesis, F35, the Arri D-21, or the Red camera. *Medium* is shot 90 percent handheld—that's the nature of the show. That puts wear and tear on the cameras and limits the use of cables. We wanted to continue to be

free running around handheld—that was my initial concern. With Genesis, we can record to [HDCAM SR] tape on board the camera most of the time, unless we are in a real small space, and that let us work the way we were used to working.

Could we make it look like the *Medium* everyone was used to? Making the actors look the same as always was an early challenge. We made the choice when picking the camera and shutter speed and lenses and filters to develop it to look as much like film as possible. I tested various lenses, and instead of [Panavision] Primo lenses, which we had used previously, we decided to use a set of [Carl] Zeiss Prime lenses that are probably 15 years old. They are a little less crisp and make the image less digital-looking, kinder to the faces. So doing that, with proper filtration where necessary, basically addressed that concern. Focus is still sharper in the HD medium, and that created a big impact on our makeup department, more than any other department. But they worked it out.

**Adams:** [On *CSI: NY*], switching was up in the air. It was based on some tests *CSI: Miami* did for an episode last season, but up until about July 1 of this year, [the network] had not decided, and I thought there was a chance we would stay on 35mm. For whatever reason, the trigger was given to switch, and we had done lots of research by then. It became clear to me that the [Arriflex D-21] and the F35 were the most filmlike cameras available. A producer, [Parnell], and myself went down to [rental house] Clairmont Camera to make a decision, and we came to the conclusion that we could use the same 35mm film lenses if we chose the F35, and we could put the SR recording deck onboard, allow-

ing us to treat it a lot like a film shoot. That made it manageable.

But what really helped a lot was incorporating new wireless [IDX CW-5HD] transmitters, which allow us to [view imagery] wirelessly all the time on set. We can record on board the camera and have the [digital imaging technician (DIT)] monitor the wireless signal and send it to us so that we can all watch it on beautiful HD monitors without a bunch of wires. Shooting in S-LOG format, we can really tell color

and exposure range, and maybe push the limit a little more than on REC709, a linear digital recording format.

There was also an issue getting our camera operators used to the camera's viewfinder and not being able to rely on them to see the image detail as well as they used to in the eyepiece. They had to relinquish a little bit of responsibility for focus and small things in the frame. We had to deal with that ourselves on the HD monitor, but we're getting used to that.



**Top:** *CSI: NY* switched from 35mm film to Sony's F35 camera system, largely using a film-style approach and retaining 35mm film lenses. Cameras record to onboard SR decks, while imagery is transmitted wirelessly for on-set viewing. **Bottom:** Syfy's *Warehouse 13* uses the Panavision Genesis camera and borrowed elements of its digital acquisition approach from other shows on the network—especially *Battlestar Galactica*.

## 2-PERF OPTION

AMONG THE NETWORK SHOWS RECENTLY asked to consider switching from film to digital acquisition was CBS' *Ghost Whisperer*. Producers and the show's cinematographer, James Chressanthis, pondered the request, but eventually declined. At press time, *Ghost Whisperer* was launching production on its new season shooting, as it always has, on 3-perf, 35mm film, while finding other ways to trim the budget.

"There is certainly attention being paid to costs, and hence, the idea that digital could possibly be done less expensively than film came up, and the network made that suggestion," says Executive Producer Ian Sander. "We felt 3-perf, 35mm film is a superior format to anything else available, and so our hesitancy about going digital was not about an aversion to ever capturing images on a digital format. It had to do with the fact that we have a hit TV series going for four years that does shoot and process film, and the machine has been working. We didn't want to change what has been working. Instead, we've been able to make new business arrangements with [film] suppliers and labs and transfer companies, and those new arrangements have allowed us to significantly lower our costs from what they were a year ago, competing with the cost of digital."

The digital trend, however, ignited a passion in Chressanthis to urge an industry discussion of cost-effective film alternatives for episodic TV. He says he has a firm belief that Super 16, frequently banned by networks from episodic television, is a viable alternative, along with 35mm 2-perf film stock. In fact, Chressanthis recently partnered with Kodak on a 3-perf/2-perf side-by-side comparison test that is currently making the rounds in Hollywood.

"I felt, when it comes to network TV, quality of the image is important to the audience, but at the same time, we are under all these economic pressures, so what to do?" Chressanthis says.



Cinematographer James Chressanthis conducted a side-by-side 3-perf/2-perf test in partnership with Kodak as part of an agenda to illustrate cost-effective film alternatives to digital acquisition for episodic TV.

"A few years ago, I saw a rerelease in a theater of [Sergio Leone's] *The Good, the Bad and the Ugly* on modern print stock. It was gorgeous, but I didn't realize it was shot 2-perf. Not anamorphic—a widescreen film shot 2-perf. The same reason [cinematographer] Tonino Delli Colli shot 2-perf [on that film] applies today: economic conditions. I also read about [famed cinematographer] Vittorio Storaro advocating 2-perf for acquisition for widescreen presentation, and I realized they are doing this in Europe and that we already have the cameras and lens systems. Plus, today, we have [Kodak] Vision3 stocks that are far superior. With that stock, I can shoot more intuitively and faster—all the detail holds. So I first did a *Ghost Whisperer* test, and that inspired me to do the [2-perf] test [with Kodak]."

Chressanthis' test involved simultaneously shooting daylight and night imagery of a young couple outside on 3-perf and 2-perf Kodak Vision3 (5207 and 5219) stock, processing both negatives at Laser Pacific, Hollywood, and transferring both on a DFT Spirit DataCine to HDCAM SR tape in 4:2:2 RGB color space at 23.976fps. Both were edited as ProRes 422 HQ files in Apple Final Cut Pro and onlined at LaserPacific back to HDCAM SR tape for tape-to-tape color correction on a Da Vinci Systems 4K system to create the master that was screened around Hollywood.

The resulting quality of the imagery, he says, is more than acceptable for broadcast television and, in his view, surpasses similar digitally acquired material. He also insists it's cost-effective.

"We ran lots of numbers, and 2-perf is definitely equivalent or cheaper than shooting on the digital systems we have now," he says. "Sure, if you shoot a music video with no DIT and a small crew, that might be cheaper. But for quality dramatic television, this compares just fine."

Chressanthis also lobbies for a re-evaluation of Super 16, insisting the format has "a bad rap" because the basis of the concern about Super 16 are older tests and poorly shot programs. Today, he says, more sophisticated cameras, optics, and the availability of the Spirit DataCine and HDCAM SR tape for transfers of Super 16 material makes the format more viable.

"The problem isn't Super 16—the problem is what you telecine it to," he says. "Super 16 is a tiny negative, and some networks made a decision based on what was delivered [many years ago] when Super 16 was delivered on [early HDCAM] tape. That's a bad format to view it, because it inherently has a lot of compression and noise associated with it. Super 16's grain, especially before Vision3 stocks, was exaggerated by the HDCAM tape format, because of the compression. That same film on D5 or HDCAM SR tape does not have the same problems." **—M.G.**

**Derek Underschultz, DP for *Warehouse 13*:** We shot the pilot on [Sony's] F23 system because the F35 wasn't available yet at that time. But [for the series], we wanted the full 35mm-sized chip, and the Genesis was attractive because it's basically the F35 with Panavision lensing and software. That choice lets us record to Sony HDCAM SR decks on tape, plus the network had a comfort level having done [*Battlestar Galactica*] that way. We created [look-up tables] for the pilot, and then for the series, we refined those at Technicolor since we were switching to F35, and reinstalled them in our [Panavision Genesis Display Processor] box so that when we are on set, we can punch up looks that are very accurate to view on our HD monitor.

dailies color correction and editorial purposes, and therefore, we can experiment and get extreme with a variety of looks that later make it into the final episode.

### What producers think

**For shows born using digital cameras, what is your basic pipeline and workflow approach, and how did you go about choosing that approach for your show?**

**Greg Tilson, associate producer on *Warehouse 13*:** A large part of the decision to shoot digitally was the success we had shooting digitally for *Battlestar Galactica* [which aired on Syfy when it was called the Sci Fi Channel, with Tilson serving as postproduction supervisor]. We recently finished a *Battlestar* movie of

editors cut on [Apple] Final Cut Pro and assemble the show in standard definition. They provide a bin to our [online editor], and the show is then reassembled in HD. We have a backup SR submaster also made, and if something goes missing, or we find a digital hit on a dailies master, we can go back to original or the backup SR tape.

It's very similar to how we are now shooting [the *Battlestar Galactica* prequel show] *Caprica*, except there, we are cutting and assembling in high-def all the way through. [For *Warehouse 13*], since we don't have SR decks inhouse, we also turned to [an independent contractor named] Pete Fausone, who essentially serves as our online editor—he does it for several shows, actually. He set up our Final Cut Pro system in our [editorial] suite, and then we cut in standard definition here. We deliver the bin to Pete, and he made a deal with a facility [FotoKem, in this case] to use their equipment to do the assembly [the show is also mastered at FotoKem]. So that is another new trend: dealing with independent contractors for online and other types of services.

**Devlin:** There is a comfort level to [having everything under one roof for *Leverage*] and a level of efficiency, but also of security. These days, so much material leaks out to the Internet. In our case, we house it all internally, and that gives us a sense of comfort. If any stuff leaks out, we can only blame ourselves.

We shoot with two or three Red cameras, recording directly to FireWire drives. Our DIT makes three redundant copies of everything. One copy is kept on set and comes back to our offices and goes into our main SAN. And then, every single department in post pulls off that same hard drive—no more trying to move around mate-

rial from one place to another or handing it off to someone to go back and find the original and scan it and bring it somewhere else. In editorial, if a shot is an effects shot, I can right click on it, and it is in the render queue for the effects people. Same with sound editors—I can pull the same scene up for them. And we are working in full resolution from soup to nuts. Editors [working in the ProRes 422 HQ format on Final Cut Pro] can cut at 4K, and everyone else can see and work the same way.

**Since high-end digital camera packages are mostly more expensive than film packages and have other costs associated with wrangling data, is there any way to quantify or illustrate the cost savings over traditional 35mm projects?**

**Devlin:** Think of it this way, in terms of making dailies. If you shoot film, you transfer them, get them onto DVD, store them, get them ready for editorial, and that can add up to roughly \$20,000 or \$30,000 a day. If you want to do a digital inter-positive on a 2-hour movie, that can cost you roughly \$250,000. We save on all that, plus less manpower trying to get data from one place to another, and we've brought the whole post chain inhouse, so there are obviously big cost reductions. We had a movie of the week originally budgeted for \$7.5 million, and we made it for \$1.4 million. Our regular TV episodes cost roughly \$1.8 million per episode, and I would argue that doing the same show traditionally for a network would come in around \$3 million an episode.

**Tilson:** [Shooting digital] can definitely be less expensive if you know what you are doing simply because it

**"WE HAVE A BIG INDUSTRY AND A LOT OF VESTED INTERESTS, AND IT TAKES A LONG TIME TO ADAPT, BUT THE BOAT IS TURNING."**

Dean Devlin, executive producer, *Leverage*

Other than not having film processing and transfer stages, our post chain is typical, but for us, this is better than shooting film in the sense that we don't have to wait for a transfer from film to color-timed HD tape, and then reassembly of the final show from that tape. When we want extreme looks, on film, we might not be able to visualize that extreme look on our dailies tapes, since we had to leave room for the final image to be manipulated in tape-to-tape color correction later. So the dailies tapes might have ended up limiting what we did in the final color correction. Here, the transfer of the [original] SR tape is only for

the week, and in that, we incorporated footage from the original *Battlestar Galactica* miniseries, which was shot on film. You can see how seamlessly the miniseries footage and the series footage and new footage, shot digitally, were combined, and how we ended up with a filmic look. We wanted *Warehouse 13* to have a filmic look, and that gave us confidence we could do it with digital cameras.

We shoot in Toronto, recording onboard the camera, and then, our master SR tapes go to Technicolor Toronto, they submaster it, sync sound, and create DVCAM dailies for us. Executives look at one set, and our



The team for *Leverage* uses a Red Digital Cinema Red One camera system recording to hard drives. The show uses an all-digital production and postproduction workflow under one roof at Executive Producer Dean Devlin's Electric Entertainment in Los Angeles.

is less expensive to shoot and process. It could be more expensive if you go hog wild and shoot way more footage than you need, increasing man hours in post to cull through dailies and cut the show down. But we went and saw the setup Dean Devlin has [for *Leverage*], and I do have to say, I think studios are probably eyeing that as a model—to essentially have an all-in-one post house and do everything in one place, largely because they view it as a way to be more cost-efficient, especially now that the cost of hardware is coming down to make it viable. They have their own mix stage, too. We haven't gone that far, largely because we have such an excellent audio facility here at Universal, but obviously, they are showing that it can be done relatively inexpensively. So as we move toward digital capture and these new models, I'd expect the implications for the postproduction

industry could be huge—assembling everything right on the stage, automating more steps. I think that is probably the direction the industry will move in.

### Film out?

**With your current experience in mind, do you think we are at a watershed moment, heralding the possible end of film for episodic TV? If so, what will that mean for the larger industry?**

**Tilson:** Honestly, I think we're almost there. We're already seeing places we work with, post houses, consider going out of business because so much of their business is film transfer, and major studios are already saying no more film for television, period. And even if some shows stay on film, they will be the exception, and as those shows finish their runs, I expect we'll be all-digital after that.

**Lonsdale:** Distributors of TV shows were always very interested in two things: foreign sales and media storage. They always felt that film was the best storage media, and foreign distribution, for years, required a film finish because of different broadcast standards. Then, slowly, they stopped requiring that film finish, and with the 1080i HD format, you can now more easily take a master and downconvert or crossconvert it to another format with little or no quality loss. So now, they are considering digital more reliable. That also opened the door for making them more comfortable about saving money shooting digital. And every year, the technology is just getting better—the F35, for instance, is just about at the pinnacle for this kind of work.

In addition, audiences are more receptive to seeing images from the digital world even if they look some-

what different. So yes, we are seeing a definite shift. I would hope film would stay around a long time. But these factors would seem to indicate we are moving away from film. If the shows are good, the audiences will be more interested in the drama or comedy they are covering than the medium it was recorded on.

**Underschultz:** Personally, I do believe this is the case. You only need to see the history of electronic gathering over the past five years and compare where it was then to where it is now. Five years ago, there were almost no [hour-long episodic] shows shooting HD. Now, probably close to 70 percent of all programming on TV is acquired electronically. This is a reality. There are lots of reasons for it, but one of the big ones is the quality of the electronic cameras out there now. I'm now shooting with a camera every bit as workable as the ones I used shooting 35mm film, with great latitude, and now, the same lenses. For all intents and purposes, I think we can make it look exactly the same, if we want to. Logically, this will progress forward.

**Reibman:** As an artist, you hope they would let you shoot whatever [medium] you thought best, but the truth is, economics are involved, and all shows, no matter if you shoot them on film or HD, are getting finished the same way and are being broadcast out in high definition. So generally, they will look as good as the [viewer's monitor] will let them. As a cinematographer, if I'm doing my job right, no one watching should be thinking much about the photography. From a cameraman's point of view, let's say I'm very encouraged, and moving quickly from encouraged to optimistic. **mm**

» **CONTINUE THE DISCUSSION** [forums.millimeter.com](http://forums.millimeter.com)