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On Our Cover: Intelligence agent Aaron Cross (Jeremy Renner) finds himself at the center of a deadly government conspiracy in *The Bourne Legacy*, shot by Robert Elswit, ASC. (Photo by Mary Cybulski, courtesy of Universal Pictures.)

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September 2012 Vol. 93, No. 9
The International Journal of Motion Imaging

American Cinematographer

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EDITORIAL

EXECUTIVE EDITOR Stephen Pizzello
SENIOR EDITOR Rachael K. Bosley
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CONTRIBUTING WRITERS
Stephanie Argy, Benjamin B, Douglas Bankston, Robert S. Birchard, John Calhoun, Michael Goldman, Simon Gray, Jim Hemphill, David Heuring, Jay Holben, Mark Hope-Jones, Noah Kadner, Jean Oppenheimer, Jon Silberg, Iain Stasukevich, Kenneth Sweeney, Patricia Thomson

ART DEPARTMENT

CREATIVE DIRECTOR Marion Gore

ADVERTISING

ADVERTISING SALES DIRECTOR Angie Gollmann
323-936-3769 FAX 323-936-9188
e-mail: gollmann@pacbell.net

ADVERTISING SALES DIRECTOR Sanja Pearce
323-952-2114 FAX 323-876-4973
e-mail: sanja@ascmag.com

ADVERTISING SALES DIRECTOR Scott Burnell
323-936-0672 FAX 323-936-9188
e-mail: sburnell@earthlink.net

CLASSIFIEDS/ADVERTISING COORDINATOR Diella Nepomuceno
323-952-2124 FAX 323-876-4973
e-mail: diella@ascmag.com

CIRCULATION, BOOKS & PRODUCTS

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American Cinematographer (ISSN 0002-7928), established 1920 and in its 92nd year of publication, is published monthly in Hollywood by ASC Holding Corp., 1782 N. Orange Dr., Hollywood, CA 90028, U.S.A., **(800) 448-0145, (323) 969-4333, Fax (323) 876-4973, direct line for subscription inquiries (323) 969-4344. Subscriptions:** U.S. $50; Canada/Mexico $70; all other foreign countries $95 a year (remit international Money Order or other exchange payable in U.S. $). **Advertising:** Rate card upon request from Hollywood office. **Article Reprints:** Requests for high-quality article reprints (or electronic reprints) should be made to **Sheridan Reprints** at (**800**) **635-7181 ext. 8065** or by e-mail **hrobinson@tsp.sheridan.com.**
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POSTMASTER: Send address change to *American Cinematographer*, P.O. Box 2230, Hollywood, CA 90078.

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THIS MONTH'S CONTRIBUTORS

Ignacio Aguilar
is a cinematographer (Short Takes, p. 12).

Rachael K. Bosley
is the senior editor ("Hair-Raising Heroics," p. 62).

Michael Goldman
is a Los Angeles correspondent for the magazine ("Natural Bourne Killer," p. 32).

David Heuring
is a freelance writer (Post Focus, p. 88).

Jay Holben
is a filmmaker and a Los Angeles correspondent for the magazine ("Optimizing Digital-Camera Workflows," p. 78).

Mark Hope-Jones
works for Arri Cine Technik and is the London correspondent for the magazine (Production Slate, p. 24).

Jean Oppenheimer
is a Los Angeles correspondent for the magazine (Production Slate, p. 18).

Iain Stasukevich
is a New York correspondent for the magazine ("Around the World in 65mm," p. 46).

Editor's Note



Photo by Owen Roizman, ASC.

Our annual focus on international production takes us all over the world, chronicling projects that passed through more than two dozen countries.

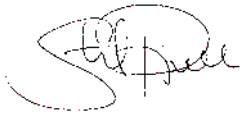
On *The Bourne Legacy*, Robert Elswit, ASC led his crew through Canada, South Korea, the Philippines and the United States. To coordinate the complex logistics, he hired separate gaffers for the three main locations: Andy Day in New York, Burton Kuchera in Alberta and Cory Geryak in Manila. "We had to have a lot of equipment in Manila for both the first and second units," Elswit tells Michael Goldman ("Natural Bourne Killer," page 32). "I did the location scout and preliminary scouting in Manila with Cory, and then I left to start the shoot in New York. Cory returned to Manila and got everything ready. By the time I got to Canada, we were ready to pre-light and go right to work in Manila."

Shooting in four countries probably seems like a cakewalk to director/cinematographer Ron Fricke and his crew, who traveled to 25 nations over five years for the 65mm documentary *Samsara*, which combines sweeping imagery with philosophical insights. Fricke feels his movie belongs in a genre he calls "impossible films — non-verbal films that sustain themselves only on images and music." He adds, "Because there are no actors, the image becomes the main character. We wanted to capture the essence of the people and places we were photographing, and a 65mm camera is the best tool to do that." Our coverage, penned by Iain Stasukevich ("Around the World in 65mm," page 46), offers a definitive overview.

This month's Production Slate presents articles on two more projects that required international passports: the documentary *Side by Side*, which elicits prominent filmmakers' thoughts on the industry's seismic transition to digital technology, and *World Without End*, a sweeping historical drama shot mainly in Hungary by Denis Crossan, BSC.

While shooting the 3-D stop-motion feature *ParaNorman*, cinematographer Tristan Oliver probably would have relished some travel to escape the confines of the Laika animation studio in Portland, Ore., where he and his crew holed up for nearly two years while meticulously crafting their whimsical movie. The art of stop motion, he muses, is "the same the world over, really: a very large shed full of tired-looking people and lots of small things." Senior editor Rachael Bosley flew north to observe Oliver in his supernatural habitat ("Hair-Raising Heroics," page 62).

Jay Holben's article "Optimizing Digital-Camera Workflows" (page 78) reports on the Image Control Assessment Series, a remarkable collaboration between the ASC and the Producers Guild of America that also involved members of IATSE, SAG, the DGA and the Teamsters, as well as various camera manufacturers, production and post facilities. A follow-up to the 2009 Camera Assessment Series, ICAS assesses the workflows of top digital cameras in an attempt to establish industry-wide standards for image control. "It's not a one-size-fits-all world anymore," says ASC member David Stump, who helped Society President Stephen Lighthill supervise the project's cinematography team. "You can mix and match cameras, and each production has the right to expect that they can all be plugged into one timeline for post. Until every post facility can do that — and provide meaningful digital archiving — we are still facing a significant deficit in the post world." Adds Lighthill, "As the production world is pushed and pulled by various technologies, this community will face more challenges and should be prepared to act together to achieve our common goals."



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President's Desk



In this issue of *American Cinematographer* are, as always, articles about the extraordinary efforts of filmmaking teams to bring you entertainment, enlightenment and information. Filmmaking teams are formed on every project, and we often forge lifelong bonds during these remarkable journeys of hard work, adventure and struggle. We remember each and every film we've made by the relationships we formed with our teammates.

Lucky are those who work together over many projects and become a sort of moveable community, traveling to different locations to make different stories come to life. The folks in this community look out for each other. For instance, a team member might get an interview to move up to cinematographer, realize during the interview that it won't happen on this project, and then recommend a cinematographer he has worked with before. A teammate has looked out for another.

The new team formed by our recently elected ASC officers and Board of Governors has started its journey together, and we are guiding one of America's oldest non-profit arts organizations through this second decade of the new century. One of our challenges is the rough water navigated by any organization that publishes periodicals and books, as we do. Oh, to operate in Germany, where the price of books is fixed by the government so that the Walmarts and Amazons and Costcos of the world cannot use printed matter as loss leaders and drive publishers and bookstores out of business. (The purpose of the German law is not economic, really; the purpose is to increase diversity in publishing.) In the United States, we have lost half of our neighborhood booksellers in the last decade. But we at the ASC have been toughened by many filmmaking campaigns, and we will continue to publish and get the word out to all of you who are interested in cinematography.

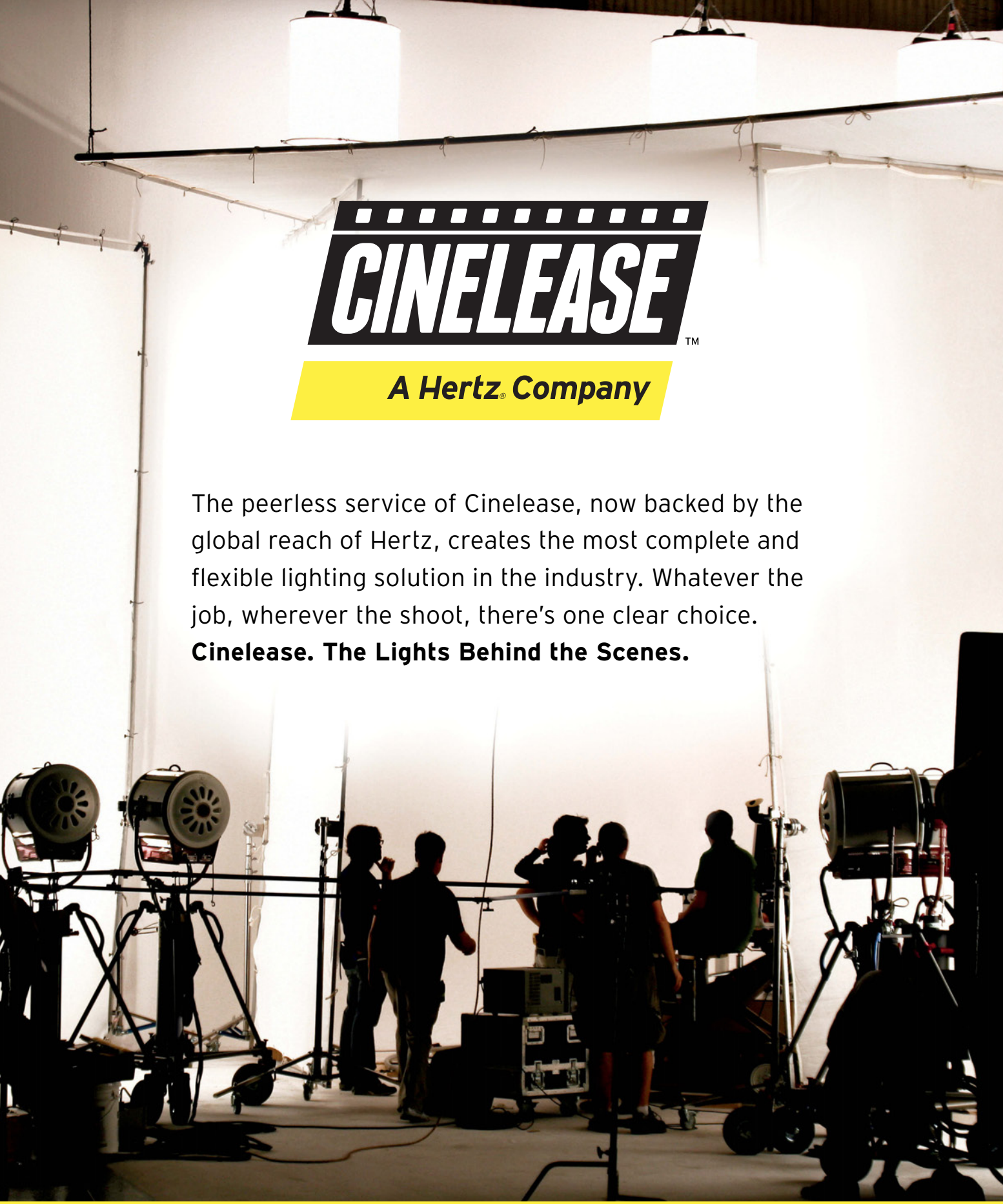
All filmmaking is community based, so to speak, and our community includes inventors, color scientists, camera manufacturers, lighting companies, programmers and, yes, film-stock manufacturers and labs, all of whom are represented in the ranks of ASC associate members. They go into filmmaking "battle" with us — they always have and always will — and they are at heart filmmakers themselves. And the challenges posed by the transformation to digital affects how our associates work, just as it affects how the ASC produces and distributes its publications. But cinematographers and our partners have been part and parcel of the "digital revolution" for quite some time. When the 10th edition of the *American Cinematographer Manual* is released, you will see it not only in print, but also in iBook and Kindle formats.

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Stephen Lighthill
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Photo by Douglas Kirkland.



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Short Takes



Guests arrive for a birthday party that proves to have a sinister twist in *8*, an award-winning Spanish short shot by Ignacio Aguilar and directed by Raúl Cerezo.

Shooting *8*

By Ignacio Aguilar

The fantasy/horror short *8* is about a boy (played by Sergio Castellanos) whose extended family comes to his home to give him a special present on his eighth birthday. In order to get the present, the boy has to fulfill his family's rather creepy wishes, which leads to an unexpected climax.

When writer/director Raúl Cerezo first approached me about the project, he said he envisioned it with little or no dialogue, and he wanted to create the impression of a classic Walt Disney short, or a feature such as *Fantasia*, by using images and music to tell the story. To find our visual style and help put ourselves in the proper mood to create a fantasy/horror movie, we looked at films like *Rosemary's Baby* (shot by William A. Fraker, ASC, to whom our short is dedicated), *The Shining* (shot by John Alcott, BSC), *Halloween* (1978, shot by Dean Cundey, ASC) and *Close Encounters of the Third Kind* (shot by Vilmos Zsigmond, ASC). We also found inspiration in the wide-angle anamorphic compositions of *The Andromeda Strain* (shot by Richard H. Kline, ASC), the underexposed interiors of *The Godfather Part II* (shot by Gordon Willis, ASC) and the low-key naturalism of *Being There* (shot by Caleb Deschanel, ASC).

Given our admiration for these 1970s classics, my initial thought was to shoot on film, but unfortunately, we couldn't afford the cost of shooting 35mm. After considering Super 16mm, Raúl opted instead to shoot digitally with the Red One camera (with its original Mysterium sensor, as the MX wasn't yet available). We knew we wanted to shoot in the 2.40:1 aspect ratio, and as we began to research lenses, we considered shooting anamorphic with a set of Zeiss Ultrascope lenses. Because the short takes place at night, though, we knew we wouldn't be able to light to the deeper stops the Ultrascopes demanded, so we chose instead to use a set of Zeiss Standard Primes (16, 24, 32, 50 and 85mm, all T2.1) for all of our interior work, and Zeiss Superspeeds (18, 25, 35, 50 and 85mm, all T1.3) for exteriors. We recorded our .r3d 4K raw files to both Red's hard-disk drives and cards, depending on the situation.

Raúl worked closely with storyboard artist Alain Martínez to carefully plan each of *8*'s 90-plus camera setups, including the angles and movements. Our idea was to use wide-angle lenses with classical compositions that included a number of elements in each frame, and to move the camera, when possible, on a dolly.

In our meetings with costume designer Esther Sánchez and production designer Beatriz Moreno Almendros, Raúl and I asked them for pastel tones, without any saturated colors. I also asked the production designer for as many practical light sources as she could provide. I was after a low-key approach, with lots of underexposure in each frame, but I always wanted to maintain an overexposed edge to avoid mushy images and retain some contrast. To put light closer to the actors when it was needed, I selected tungsten-balanced Kino Flos for their compact size and inherent softness.

In order to get the right atmosphere for our interiors, we decided to smoke all of the sets. Additionally, I wanted to use some mild diffusion filters to create halos around light sources and soften the image a bit more; I ended up using Black Pro-Mists, primarily ¼ density for interior work and ⅛ for exteriors (plus ½ for a couple of shots). Despite shooting digitally, we wanted *8* to look as though we

Photos by Javier González Manso. Photos and frame grabs courtesy of the filmmakers.

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Clockwise from top left: The camera crew lines up a shot on their first day of work while actress Carmen Ruiz rehearses a scene in front of a mirror; in a frame from the film, Ruiz gazes at her reflection; the crew positions a life-size puppet for a car sequence that was partially shot on a soundstage.



had underexposed film and printed it up to get a thin negative with milky blacks and low color saturation.

Due to location and crew availability, we decided to split principal photography into two periods, shooting interiors over four days in early December of 2009 and exteriors over three nights in late January of 2010. Our primary location was a house in Boadilla del Monte, just outside Madrid.

I decided blue light would be the perfect link to maintain a consistent look across establishing shots of the house and our exteriors on dark roads. Blue light was used in many of the films we referenced to suggest a nighttime feel, and it was practical to light the exteriors with uncorrected HMIs. Since I had decided to use warm tones inside the house, I felt that the contrast would be appealing and would help the viewer distinguish between the parallel actions taking place inside and outside the house.

I lit the exterior of the house with some warm practical fixtures along the fence and near the main entrance, and I keyed the actors with a 2K Fresnel and backlit them with a 1.2K HMI Par. Inside the house — for example, in the kitchen and corridor — I also mixed warm practicals with HMI light coming in through the windows. Of course, this is a theatrical effect and not realistic, but I think it works for a fantasy project.

The first scene we shot took place in the mother's room. We placed a practical on each side of a mirror in which the mother (Carmen Ruiz) looks at herself, and we also placed a lamp on each side of the bed. To raise the ambient level a bit, we bounced a 1K Redhead into the ceiling. Since I was underexposing and shooting against bright practicals, I added some cooler backlights to the mother and child to help separate them from the backgrounds. With the camera set to 5,000°K at 320 ASA, I shot the scene at T2.5; I metered the camera at 80 ASA because of an 80C and IR filter in addition to the Black Pro-Mist. After this first scene, we were concerned that we might be working too near the toe of the curve, so we decided to remove the 80C filter, set the camera to 3,200°K, meter at 125 ASA and shoot the rest of the interiors wide open at T2.1. Of course, this produced more noise in the blue channel, but it also allowed more light to reach the sensor. (As it turned out, though, the first scene did not need to be altered in terms of exposure, while the rest of the film had to be darkened in the final grade.)

Most of the action inside the house takes place downstairs, in a hallway and a parlor. The hallway was especially difficult: it was a tiny space, we were shooting with wide-angle lenses, and we had moving characters. For simplicity's sake, I decided I could live with a flatter look, so I bounced a Redhead into the ceiling for my key light.

The parlor was much larger, about 25' long and 12' wide. The characters would primarily sit or stand around a big table, so it seemed natural to light from above the table; for the key light, I constructed a chicken-coop with eight 200-watt bulbs carefully positioned to avoid double shadows or wall shadows. When a character would stand off to the side of the room, we would light them with a bounced 2K Blonde or two 1K Redheads. For practical sources, I used regular 150-watt bulbs. By following this strategy, I was able to shoot 180 or even 270 degrees with very little adjustment.

A month and a half after wrapping at the house, the crew reunited for the night-exterior work, which proved difficult for seve-

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Top: Practical sources and a handmade top light provide eerie ambience for a scene in the project's main location. Bottom: A corresponding frame from the short.



ral reasons: we were shooting during the cold winter in the middle of nowhere, we needed shots inside and outside of a moving car, we wanted to use a lot of smoke, and we had mechanical special effects created by Colin Arthur (who has worked on such films as *2001: A Space Odyssey*, *Ryan's Daughter*, *Barry Lyndon*, *Alien* and *The NeverEnding Story*.) Colin gave us advice on how to smoke our interiors and instructed technician Luis de las Heras on how to do it properly, but his real on-set involvement was with our night-exterior work, creating and controlling the fog effects himself with a machine he had originally devised for *Conan the Barbarian*. He and his assistant, Sarah Pooley, also created a wire-controlled puppet to stand in for actor Julio Vélez during the shooting of an accident scene toward the end of the film. We needed so much smoke around the car that we decided to shoot that portion of the night exterior on a soundstage. After shooting in the cold for two nights, being onstage was a relief. I strove to maintain the direction and intensity of the light from the location exteriors, and I feel the shots fit together seamlessly.

For night-exterior work I set the Red One to 5,000°K and rated it at 160 ASA, lighting with HMI Par lights. (Later, in post, I added blue to the image.) Despite having to light a large area, I could only afford a few lights: one 2.5K, two 1.2Ks and one 575-watt unit. Most of the time I used them as hard lights — to create higher contrast and a rougher-edged look on Julio as he was driving the car and to differentiate these scenes from those inside the house — but we also carried a large frame of Light Grid Cloth for when we needed to light a big area with softer ambient light.

We did the final color correction in 2K resolution, creating 16-bit TIFF files for colorist Juan Ignacio Cabrera at Filmbakers. During the grade, we made the blacks a bit blacker (but not crushed) to make the interiors look warmer and darker. We also added blue to the night exteriors.

Alejandro Pérez provided our digital effects, erasing cables and booms and helping us hide continuity problems. He also digitally added some out-of-focus points of light in the background of our driving shots to help create a sense of motion. (Pablo Gotor and Alberto Díaz from Mordisco Films also contributed some wonderful digital-manipulation work.)

Finally, we tested the finished film twice, digitally projecting it at 2K in two different theaters. After discussing the results, we decided to digitally add "film grain" to the final master; even with all of the smoke, diffusion and underexposure, the image was still too clear, and the grain helped enhance the 1970s look we wanted. Javier Gallén helped us add the grain, as well as some more vignetting in our wide shots, and Antonio Casado from Timelapses.es created our final DCP master.

As *8*'s co-producer (with both Raúl and Javier González Manso), I'd like to thank everybody involved with this short film, and as the director of photography, I especially want to thank my grip, electric and camera crews. Most of all, I want to thank Raúl, whose passion for filmmaking, vision, sense of composition and interest in cinematography has allowed me to work at my most effective. ●

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Production Slate



In a frame grab from the documentary *Side by Side*, a piece of Imax film negative illustrates the image areas of 15-perf, 8-perf, 5-perf and 4-perf film formats.

A Tectonic Shift in Imaging Technology

By Jean Oppenheimer

The idea for the documentary *Side by Side* took root in 2010, when Keanu Reeves was serving as a producer and actor on the indie feature *Henry's Crime*. Long hours of postproduction at Technicolor New York gave rise to discussions about the increasing use of digital technology and what that meant for the future of celluloid. Reeves listened as post supervisor Chris Kenneally, Technicolor senior digital colorist Tim Stipan, color timer Don Ciana and vice president of theatrical sales Charles Herzfeld (an ASC associate) weighed the pros and cons of both formats. Herzfeld gave Reeves a two-hour tour of Technicolor, walking him through the photochemical process.

"I turned to Chris and said, 'We should do a documentary about this,'" recalls Reeves, adding with a laugh, "We didn't quite know what that meant, but we just went with the idea of trying to record this moment in time when things were starting to change." That was in the fall of 2010, when digital image capture was still considered primarily a tool of independent cinema.

Preproduction on *Side by Side* began shortly after that conversation. "It was a very homespun production," acknowledges producer Justin Szlasa. "Our team consisted of me; Keanu, who served as both interviewer and co-producer; director Chris Kenneally; and cinematographer Chris Cassidy."

The documentary wouldn't take a position on whether one format was "better" than the other; rather, it would follow the moviemaking process from beginning to end — from capture to archiving — and explain how both processes worked and reveal what people in the industry had to say. In light of how swiftly technology was moving, it was important to make a documentary that didn't feel dated; according to Kenneally, that meant talking about things in a more general, philosophical way, rather than getting caught up in data or the makes of specific cameras.

Moreover, the four wanted to make a film that was accessible to the layperson but not boring to people in the industry; something that communicated a substantial amount of information but didn't feel overly "educational"; something that, above all, was enjoyable to watch. As Szlasa cautioned his colleagues during their first production meeting, "There is a real opportunity to make something here that is *really* dull."

To educate themselves about the subject matter, Szlasa says they "read a bunch of back issues of *American Cinematographer*. We also talked to people like David Stump, ASC, who is a tremendous resource; cinematographer Geoff Boyle, FBKS, who provided a great overview; and people like Herzfeld and editor Walter Murch, who are experts in their [respective] areas."

It was Herzfeld who suggested starting at Plus Camerimage, the annual cinematography festival in Poland, which was taking place in a matter of weeks. "It's a great place to be if you are going to be interviewing cinematographers," Kenneally notes with a laugh. "They're everywhere."

Cassidy, whose background is in documentaries, shorts and music videos, suggested using a Panasonic AG-HPX170 to shoot *Side by Side*, citing the camera's speed, convenience and portability, all of which would prove useful at the festival. "It's a really good, compact, reliable HD camera, and I knew we would be interviewing

Photos by Justin Szlasa and Stephan Ukas-Bradley. Photos and frame grabs courtesy of 2012 Company Films LLC.



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Filmmakers interviewed for the documentary include director James Cameron (top left), visual-effects supervisor David Stump, ASC (top right), directors Lana and Andy Wachowski (right) and 3-D expert Vince Pace, ASC (bottom), shown with interviewer/co-producer Keanu Reeves, camera operator Kyle Blackman and cinematographer Chris Cassidy.



people on very short notice and with no real time to set up," he explains. Plus, the filmmakers needed to be able to shoot for long stretches of time without stopping the flow of the conversations; most of the interviews lasted between 40 minutes and an hour.

The production utilized two HPX170s, one owned by Cassidy and the other purchased for the shoot; one was always locked off on the interviewee, while Cassidy handheld the second one, using it to shoot the subject from different angles and to get shots of Reeves as he asked questions. "We were concerned how it would look with one camera locked off and one not," acknowledges Cassidy, "but they edited together well."

Cassidy also employed his Canon EOS 5D Mark II. "A lot of our B-roll was technical stuff: film going through cameras, knobs and buttons, chemicals going through machines," continues Cassidy. "I shot a lot of macro-photography, and the 5D enabled us to add some really great Canon lenses that we would not have been able to use with the 170. My package contained a 100mm Macro Canon L series; a 20-35mm short zoom; and a 50mm T1.2, which is a really fast lens — if I was in a space where I needed more light, I had it with the 50mm." The B-roll was shot in facilities all around the globe, including Deluxe, Panavision, Red, Company 3 and Light Iron in Los Angeles; Kodak, Sixteen19, AbelCine and Silicon Imaging in New York; Technicolor in New York and L.A.; Industrial Light & Magic and Lucasfilm near San Francisco; and MPC and Framestore in London.

"As far as lights go, we traveled with a basic three-light kit," says Cassidy. "We used Lowell Tota-lights, which are very compact, rugged and versatile, and up front we diffused our key light with a Chimera soft box. It was a pretty simple setup."

As soon as the team arrived at Cameramage, they started grabbing cinematographers. "Can you imagine lighting and shooting some of those guys?" asks a still incredulous Cassidy. "They've shot some of the best movies ever made. A couple of them were like, 'Move that key light over here.' They were schooling me! I learned a lot."

About 140 people were interviewed for the documentary, including directors, cinematographers, visual-effects supervisors, digital colorists, producers and even actors. About 70 of them ended up in the finished movie. "Christopher Nolan only had about 20 minutes free [during] the whole of 2011," half-jokes Kenneally. "We interviewed him on the set of *The Dark Knight Rises*." Nolan agreed to do the interview after receiving a personal letter from Reeves, who typed the request by hand on his manual Olivetti. Cassidy is convinced that using an old-fash-

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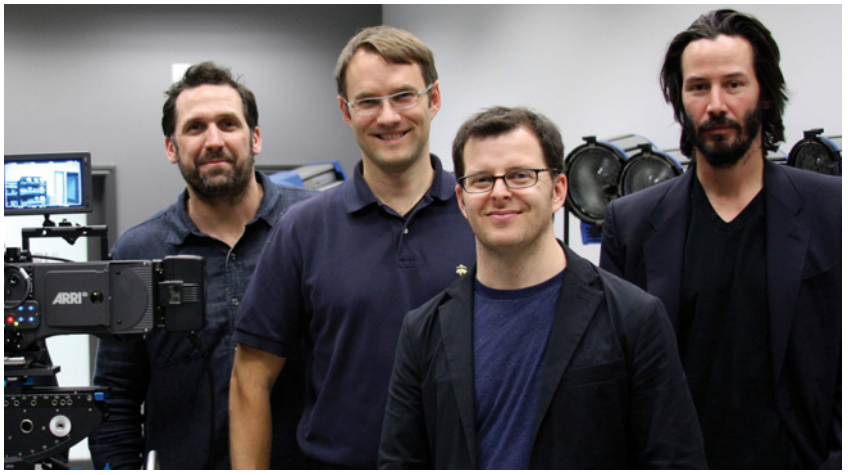


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Leading the *Side by Side* production team were (from left to right) Cassidy, producer Justin Szlasa, director Chris Kenneally and Reeves.

ioned, manual typewriter did the trick, but Reeves isn't so sure, commenting, "I don't know why Nolan said yes; I am just very grateful that he did."

The more people the filmmakers talked to, the more they learned, including which movies are considered digital milestones. "Certain films kept cropping up: *The Celebration*, *28 Days Later…* [*AC* July '03], *Slumdog Millionaire* [*AC* Dec. '08]," says Kenneally. "I looked up the films on IMDb and found that the same person had shot all three of them: Anthony Dod Mantle [ASC, BSC, DFF]. We caught up with him in London."

Dod Mantle is often credited with getting the digital ball rolling with the Danish feature *The Celebration*, which he shot with a Sony DCR-PC7E camera. The picture won the Grand Jury Prize at the 1998 Cannes Film Festival, significantly raising digital's profile. "Digital cameras have become the convention," observes Dod Mantle, speaking to *AC* from his home in Denmark, "but I believe you have to assess each story individually and decide which format is best for the particular story. I think the reason my digital work gathered momentum was because I was attracting people who were interested [in using it], and I wasn't scared to try things.

"I can't talk about one format without talking about the other," he continues, "because they are both subservient to something much bigger, which is communicating a story and emotionally supporting [that story]. Granted, the format used can have enormous financial [implications], but those issues have far less significance for me."

Director of photography Reed Morano (*Frozen River*, *Little Birds*) echoes Dod Mantle's sentiments that different formats lend themselves to different projects. She shot two of her last four movies digitally and two on 35mm. But speaking to *AC* from her home in New York, she admits to having a special fondness for film. "I have an old-school mentality. I really do think it's not just about the look but also about the mentality that shooting film creates and the kind of vibe it creates on a set. Everyone is on [his or her] A-game when shooting a movie, but I think they are even more so when shooting film because you can hear the money running through the camera.

"The accessibility of digital is great, giving everybody an artistic voice," she continues, "and I embrace the DI, but digital can also be very harsh on skin tones. And since you can shoot continuously for hours with a digital camera, it can wear everyone out, both crew and actors. As a camera operator I can tell you that carrying an Alexa on your shoulder for 16 hours straight has physical ramifications."

Visual-effects supervisor and effects cameraman David Stump, ASC (*X-Men*, *Quantum of Solace*) believes that "the tools now are so good and so transparent that you can start with film and get a digital look, and start with digital and get a film look. I find, however, that most producers have already decided on what their workflow is going to be [before interviewing potential cameramen].

"I'm still in favor of using film everywhere you can," he submits, "but that window of opportunity is [closing fast]. Shooting film is a harder and harder sell these days. Certainly, it requires a heroic effort to finish a movie all on film. But archival is the toughest nut to crack. There really isn't much alternative [to film]."

Side by Side, which was edited and color-corrected at Sixteen19 in New York, premiered at the 2012 Berlin Film Festival. Asked if anything they encountered while making the documentary had surprised them, Reeves says that, for him, it was when David Lynch said "he thinks he might be finished with film. His work is so aesthetically beautiful; I think of the images as filmic images, and I was surprised he might be walking away from my concept of what he had done so wonderfully."

Szlasa confesses, "We became totally convinced by whomever we had interviewed last." Cassidy recalls the interview with David Fincher, a strong proponent of digital. "We got out of there and were all like, 'That was amazing. He's so inspiring; he's doing it right.' Then we'd talk to Chris Nolan and say, 'Oh, man, there's nothing better than film.'"

Szlasa says he expected most of the cinematographers and directors to come down hard on one side or the other of the film/digital debate. What surprised him was how conflicted some of them felt. "David Tattersall [BSC], who is a big digital partisan, has a real affection for film. So do young cinematographers like Bradford Young. I thought the older cameramen would be pro-film and the younger people pro-digital, but that's not how it worked out."

Morano, for one, sees no reason to choose one format over the other. "I think the world needs to stop saying it needs to be one or the other. Both formats need to coexist for our creativity. It's a beautiful thing that we have so many choices because it offers a wide range of what your visuals can look like. We are only limiting our industry by trying to take film out of the equation."

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Top: Dramatic lighting enhances an interior scene from the period drama *World Without End*, shot by Denis Crossan, BSC. Bottom: Although the historical saga is set in the fictional English town of Kingsbridge, sets were built in Hungary, on stages at Korda Studios and at nearby sites.





A Historical Epic Shot in Hungary

By Mark Hope-Jones

The success of the 2010 miniseries adapted from Ken Follett's *The Pillars of the Earth* made it practically certain that a similar adaptation of Follett's sequel, *World Without End*, would follow. Both stories take place in the fictional English town of Kingsbridge, though the action in *World Without End* begins in the year 1327, almost two centuries after the events depicted in *Pillars*. The sprawling story follows a large number of characters across several decades, depicting the struggles of feudal society and incorporating real historical events such as the Black Death and the Edwardian War.

Director Michael Caton-Jones, whose credits include *This Boy's Life* and *Rob Roy*, was hired by the producers in a bid to achieve a cinematic feel for *World Without End*. A native of Scotland, Caton-Jones trained at the National Film and Television School in London. Coincidentally, the cinematographer brought in for the show, Denis Crossan, BSC, was another Scot who started his professional life by traveling south to study at the NFTS. Crossan has since shot a number of high-profile commercials and features.

When they began prepping *World Without End*, neither Crossan nor Caton-Jones felt inclined to take much reference from the preceding miniseries. "A number of our crewmembers had worked on *Pillars*, but generally, it was a whole new deal, and I didn't really see it as a sequel," says Crossan. "In truth, I didn't see any continuity other than the name Kingsbridge! Like many medieval films and dramas do, *Pillars* went for a grim, gritty look, and Michael definitely wanted to move away from that."

Caton-Jones notes, "I started researching medieval paintings because that's the only visual reference for the period, aside from architecture. Art at that time was not particularly refined, but I came across the Pre-Raphaelites, and even though that was a Victorian representation of the Middle Ages, it had a bucolic feeling that I felt might provide an appropriate palette for *World Without End*, given the nature of the story. I also looked at the French painter Millet. We pulled our look together from those influences — the shades, tones and the representation of nature."

The six-month shoot took place mainly in Hungary, onstage at Korda Studios and also at a giant set of Kingsbridge that was built from scratch on a nearby site. Crossan was present on early scouts to make sure the Kingsbridge set was designed to allow best use of the sun for exterior work. "We tried to keep scenes as backlit as possible because the sets looked more evocative with some modeling," he says. "That meant we had to spend time working out shadows and calculating the best time of day to shoot certain scenes. If it was overcast, we would still shoot, but in general, I wanted as much sunlight as possi-

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Top: Shafts of light illuminate a period interior. Bottom: A behind-the-scenes photo shows the crew's lighting approach to onstage windows behind a set wall.

ble. The difficulty came if we started a scene with the sun and then lost it. I usually had at least three 18K HMIs on hand to match the sun in those instances, and we always started with the wider shots, so it was just mids or closer stuff we had to light."

Crossan shot with Arri Alexas, a decision prompted as much by logistical concerns as anything else. "I had used the Alexa and the Red [One] before and was happy with both, but what the Alexa had going for it was that Arri had a presence in Budapest," he explains. "We needed a whole lot of cameras, lenses, accessories and backup, and Arri could provide all that.

"Also, I wanted to keep the equipment as compact as possible, but still have a lot of variation in what we could achieve. I didn't want to drag around a big crane that would take a lot of time to set up, but our characters are often on horses, so we had to work at different [camera] heights. I decided to use a Fisher dolly and jib arm in combination with Arrimotion, a remote and repeatable head that you control from a geared head. Mainly it was useful in tight spaces and on the jib arm, and it was quite fast to use."

While pondering the show's camerawork, Caton-Jones took inspiration from films such as *Sweet Smell of Success* and *Paths of Glory*. Crossan notes, "What Michael liked in those films was the use of a long establishing shot in which the actors and the camera move around each other in a sort of choreographed dance. That's very dependent on actors hitting marks and acting whilst also being aware of the camera. Some of our actors found that difficult to begin with, but very quickly everyone got into it, and we carried it through the whole show, usually working very traditionally on the dolly."

For Caton-Jones, this approach was crucial to achieving a cinematic look. "A camera move should be motivated by something within the frame," he says. "The placement of people within the frame should denote their emotional or psychological importance at any given point. I learned from the films of Alexander Mackendrick and John Ford that you should be able to tell the relative emotional dynamics [of a scene] with the sound turned down. The fact that I had those Pre-Raphaelite paintings in my mind also pushed us towards classical, balanced compositions."

Crossan utilized SxS Pro cards to record ProRes 4:4:4 Log C images, maintaining the EI 800 base sensitivity. He chose not to create specific looks for different phases of the story. "My idea was to keep it pretty simple," he says. "All the interiors are candlelight, torches and flames, so it makes sense for them to look similar throughout. When we started prep, everyone was keen to talk about workflow and what we would do with look-up tables, but that sounds to me like something you'd talk about in an accountant's office.

"My response was to say that we'd have just three grades, and that's pretty much what we did," continues the cinematographer. "I shot tests with candlelight and torches, took them to Colorfront in Budapest, and created a few simple looks that would cover us for day and night exteriors and interiors. I also created a slightly grittier look for the Plague sequence, but there really were only about three grades we applied to the whole thing. Colorfront sent me reference images every day, which was very helpful. When I started the final grade at Technicolor in London, I found the simplicity of that approach could be carried right through."

Interiors range from dark hovels to grand banqueting halls, and windows are sometimes small and sparse even in the latter. One set that bucked this trend was the Palace of Westminster, which Crossan had to light for both day and night scenes. "Initially, they didn't have any proper backings for the windows, but I knew we'd need something out there," he recalls. "The windows were also too clear, which wasn't appropriate for the period, so we mucked them up a bit. They created a simple backing of painted blocks, with no detail at all, and that was enough to give the impression of structures outside. I didn't want to solve the problem

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Top: Kingsbridge's villagers at work. Bottom: Armed with his viewfinder, Crossan navigates the Hungarian landscape.





by just blowing out the windows because that wasn't right for the look of this show, and it would have been a bit lazy."

For day interiors on this set, Crossan's crew positioned 20Ks on scissor lifts behind the large windows, raising and lowering them to represent different times of day. Toplight was achieved either with space lights or floor lights bounced into a 20'x20' frame with skirting to keep spill off the walls. "I rigged that set so that we could easily go from day to night, because we often had both day and night scenes on the same schedule," notes Crossan.

One of those night scenes portrays a banquet, with tables dotted around the large space. "The primary light source was supposed to be candles," says Crossan. "I had space lights and localized soft boxes above the tables, where the candelabras were, and everything was on dimmers so we could bring the color temperature down to match the candlelight. That made it quite warm, and I could also tweak the color temperature on the Alexa. Hard lights like 5Ks were hidden in corners and bounced into poly, and then we'd flag off anything I didn't want on the floor to get the effect of a streak of light."

Crossan's main lenses were Cooke S4 primes, though he also carried Angenieux Optimo zooms and Arri Tilt Focus Lenses. (The latter were used for moments of heightened tension or character introspection.) Exteriors were exposed between T4 and T5.6, and interiors between T2 and T2.8. "The focus pullers had a hard time because we shot on a lot of long lenses," says Crossan. "In general, the widest we shot was a 32mm, and everything else was longer, going up to 180mm. I always took meter readings before looking at the waveform monitor, and it often seemed that if the meter was reading T2, I could actually go down to T2.8. Our DIT [digital-imaging technician] initially thought I was doing everything on the low side, but after a while, he got into it, and he'd actually come to me to say he thought we could push a scene down a bit!"

Crossan would often ride the T-stop during a shot, or even make a manual stop pull when the action transitioned from exterior daylight to a much darker interior. He recalls, "There was a scene where Godwyn [Rupert Evans] is standing at his mother's doorway and asking her to kill her brother. Michael wanted to do something visually to make his character seem more sinister, so I kept most of the light off him and opened the lens up enough for the background of Kingsbridge market to be overexposed and have quite a harsh, jagged look. Rupert played the scene and took a step back into the light, at which point I stopped down, and that brought the background back to normal. I'm not sure anyone will notice it, really, but it was a fun thing to do, and it seemed relevant to the emotion of the scene."

TECHNICAL SPECS

1.78:1
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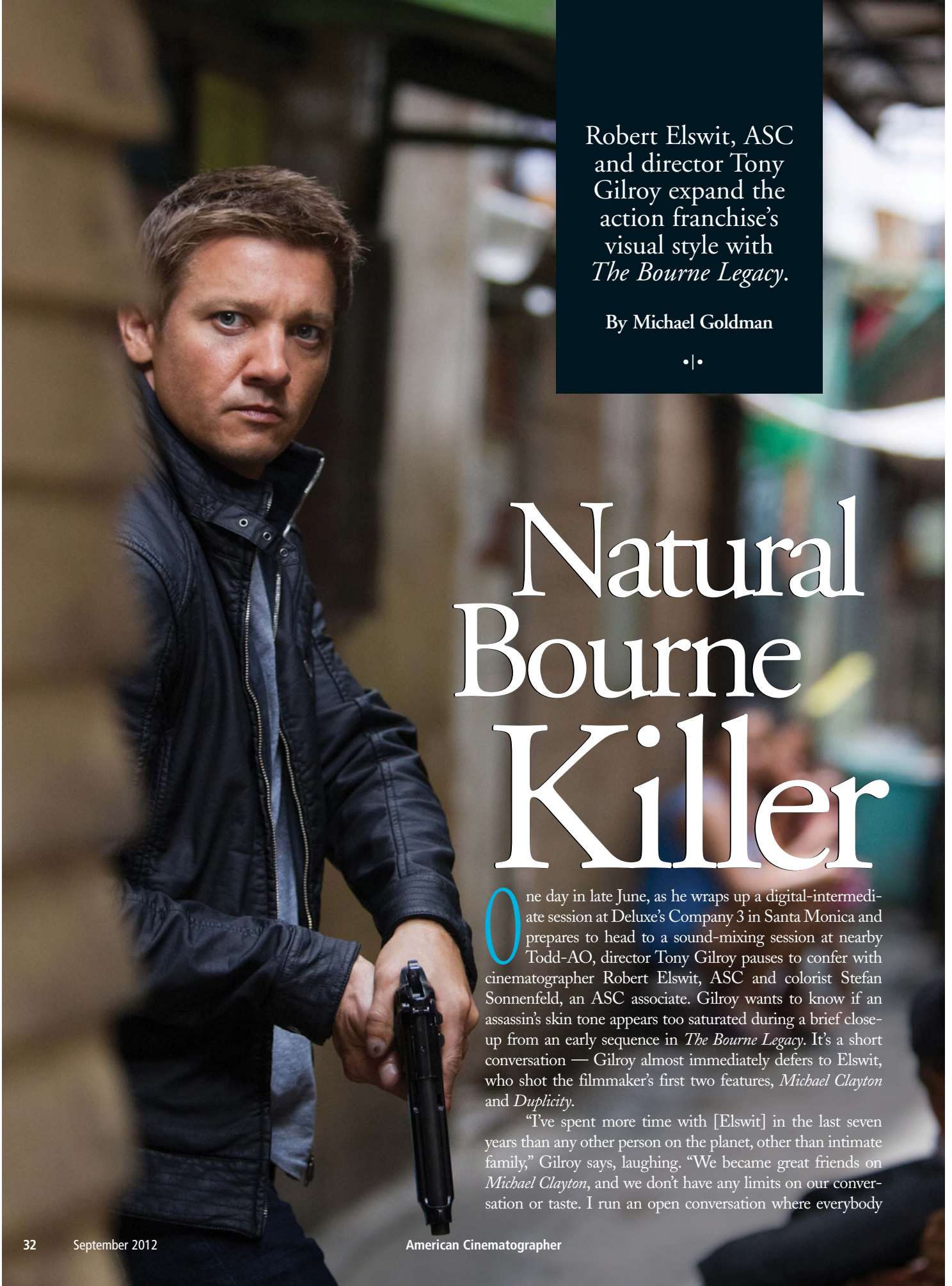
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– David Connell, DP





Robert Elswit, ASC and director Tony Gilroy expand the action franchise's visual style with *The Bourne Legacy*.

By Michael Goldman

Natural Bourne Killer

One day in late June, as he wraps up a digital-intermediate session at Deluxe's Company 3 in Santa Monica and prepares to head to a sound-mixing session at nearby Todd-AO, director Tony Gilroy pauses to confer with cinematographer Robert Elswit, ASC and colorist Stefan Sonnenfeld, an ASC associate. Gilroy wants to know if an assassin's skin tone appears too saturated during a brief close-up from an early sequence in *The Bourne Legacy*. It's a short conversation — Gilroy almost immediately defers to Elswit, who shot the filmmaker's first two features, *Michael Clayton* and *Duplicity*.

"I've spent more time with [Elswit] in the last seven years than any other person on the planet, other than intimate family," Gilroy says, laughing. "We became great friends on *Michael Clayton*, and we don't have any limits on our conversation or taste. I run an open conversation where everybody



Opposite page: Aaron Cross (Jeremy Renner), a specially developed intelligence agent, finds himself in the crosshairs of a deadly government conspiracy in *The Bourne Legacy*. This page, top and middle: Cross and a targeted scientist, Marta Shearing (Rachel Weisz), elude their pursuers in Manila. Bottom: Cinematographer Robert Elswit, ASC wields his meter.

can say what he wants. I want every single person on set to be a filmmaker. That said, it's also true that the camera department is first among equals for me. On this film especially, because I had never done anything [this technically complicated] before, I was always interested in what [Elswit] had to say."

Going into *The Bourne Legacy,* the main challenge the filmmakers faced was making their movie fit seamlessly within the larger *Bourne* world. The new film's conceit is that the three previous adventures, involving Jason Bourne, were merely the blueprints of a much larger conspiracy. *Legacy* introduces Aaron Cross (Jeremy Renner), a character who serves as living proof that the nefarious Treadstone and Blackbriar projects — which appeared to climax in *The Bourne Ultimatum* (*AC* Sep. '07) — had grown tentacles reaching far beyond Bourne. As secretive government agencies attempted to cover up their actions in *Ultimatum*, they simultaneously tried to snuff out other people and secrets, including Cross and a scientist named Marta (Rachel Weisz).

Gilroy has scripted each film in the franchise, but *Legacy* marks his first turn in the director's chair, following Doug Liman on *The Bourne Identity* and Paul Greengrass on *The Bourne Supremacy* and *Ultimatum*. Elswit





Unit photography by Mary Cybulski, courtesy of Universal Pictures.

Natural Bourne Killer



Top: Cross prepares a fake passport. Bottom: The agent engages in a heated exchange with retired Col. Eric Byer (Edward Norton).



assumed cinematography duties from Oliver Wood, who shot all three of the previous pictures.

The first three *Bourne* movies established a frenetic action language that has since become widely emulated, and the team behind *Legacy* had to determine just how much of that language to carry over. Gilroy admits, "That was something we were very conscious of, almost to the point of anxiety as our start date got closer." He adds that he gathered his team to watch the previous *Bourne* films and "gut-check ourselves" just 10 days before principal photography began in late 2011. Their conclusion was that "we were broadening the perspective of this story, so we had not only a right but maybe a responsibility to expand the visual style," Gilroy says. "The other movies showed you a corner of this world, and now we are tearing back the curtain, so we went for a wider, more encyclopedic visual vocabulary while keeping our basic palette and still having balls all the way through, particularly with the visceral action that *Bourne* has become known for."

Elswit feels that the franchise's previous filmmakers created visuals that "have become the signature style of contemporary action features." He reserves special praise for Wood, editors Saar Klein and Chris Rouse, and directors Liman and Greengrass, whose work he strategically "quotes" in *The Bourne Legacy*. "Their use of documentary-style handheld cameras — as well as abundant but non-traditional coverage, accelerated editing tempos and a realistic approach to set design — has come to define that style of filmmaking," he says.

"What I've always been most impressed with in the *Bourne* films is Oliver's approach to lighting, " Elswit continues. "The light always seems source-driven, but it still manages to impart a strong dramatic underpinning without ever calling attention to itself. This non-theatrical, almost completely

naturalistic style is as important to the look as handheld cameras, and it's a lot harder to do. It's a key element that gives the *Bourne* movies their authenticity and makes them come alive. Creating the dramatic tension that Oliver's naturalistic approach to lighting achieved was the most important visual element I tried to carry over into *Legacy*."

The latest installment begins within the timeframe of *Ultimatum*'s final 20 minutes. A handful of takes shot by Wood for *Ultimatum* appear in two places within *Legacy*, and new footage was shot to reveal different angles on those sequences. To help hide the seams, Elswit opted to shoot *Legacy* in 4-perf Super 35mm, framing for 2.40:1 exhibition.

Two cameras rolled simultaneously throughout the production. Elswit notes, "We looked for non-traditional coverage, but probably shot a little less of it than on the previous *Bourne* films. Sometimes it's almost impossible not to shoot over-the-shoulders. Also, although we were handheld throughout, we vibrated the camera somewhat less than was apparent [on *Ultimatum*]. The different nature of our story, and Tony's taste, made us shy away from some of the extreme camera shake and a 'Cuisinart approach' to coverage."

Elswit worked with Panaflex Millennium XL and PanArri 235 camera bodies, using Kodak Vision3 200T 5213 stock for day exteriors and bright interiors, and 500T 5219 for nights and dark interior work. He relied primarily on Primo prime lenses (14mm all the way through 150mm), along with Panavision zooms (24-275mm and 19-90mm) and Angenieux zooms (27-68mm and 15-40mm).

Baz Idoine, who served as A-camera first AC on the main unit and second-unit camera operator and cinematographer for additional photography in New York, adds that the production used "the regular gamut of Technocranes, Libra heads, cranes on insert cars, Steadicams and handheld cameras — including what we call our 'football' package for when we needed a smaller, lighter camera for fights and action.





Top: Crewmembers propel a special snow rig while capturing action shots on location in Alberta, Canada. Bottom: Elswit captures the burn as Shearing's house goes up in flames — a real pyro sequence shot on Staten Island.

"The 'football' is basically an Arri 235 with the eyepiece removed," Idoine continues. "We add a small monitor and lightweight lenses. It also has handles that drop down from the top so the operator can run with it and do fast, violent pans. It's quite handy for action."

The nature of the action sequences also allowed the production to take extensive advantage of specialized camera-vehicle technologies, including the Go Mobile shooting-platform system and Grip Trix motorized camera dollies. "The Go Mobile system was used a lot by [second-unit director] Dan Bradley's team when we were in the Philippines," explains A-camera operator Andrew Rowlands. "We put a Technocrane and arm operator on it, and we also had two handheld camera operators seated inside it. In New York, we used the Grip Trix because we could sit on it handheld or

Natural Bourne Killer





Top: Cross and Shearing make their way down a bustling street in Manila, where the production could not fully control traffic. Gaffer Cory Geryak, who supervised lighting requirements in the Philippines, says the biggest overall challenge of the Manila shoot was "coordinating the shifting of gear around the city." Bottom: Weisz runs through a narrow Manila alleyway for a key Steadicam sequence.

with a Steadicam for chase sequences."

One of the film's big action setpieces occurs at Shearing's home. Agents have been dispatched to eliminate the scientist, but they find themselves confronted by Cross. In the story, the house is supposed to be in the Virginia suburbs, but the filmmakers wanted to shoot at a historic home in upstate New York. "We found an extraordinary 19th-century Hudson Valley house where we wanted to film these 12 or 14 minutes of mayhem," Gilroy explains. However, he adds, "the architect hired by a local historical society to preserve the house said they couldn't allow it. That was close to our start date, and it left a hole in our world.

"That's why you want to have all these filmmakers around you," the director continues. "We talked it out, ran numbers and realized there was just enough space onstage at Kaufman Astoria Studios in Long Island to build most of the house interior. So [production designer] Kevin Thompson reproduced the house with a few changes to make things easier for us, and we had enough control [onstage] to make it worthwhile. It worked beautifully."

For Elswit and New York gaffer



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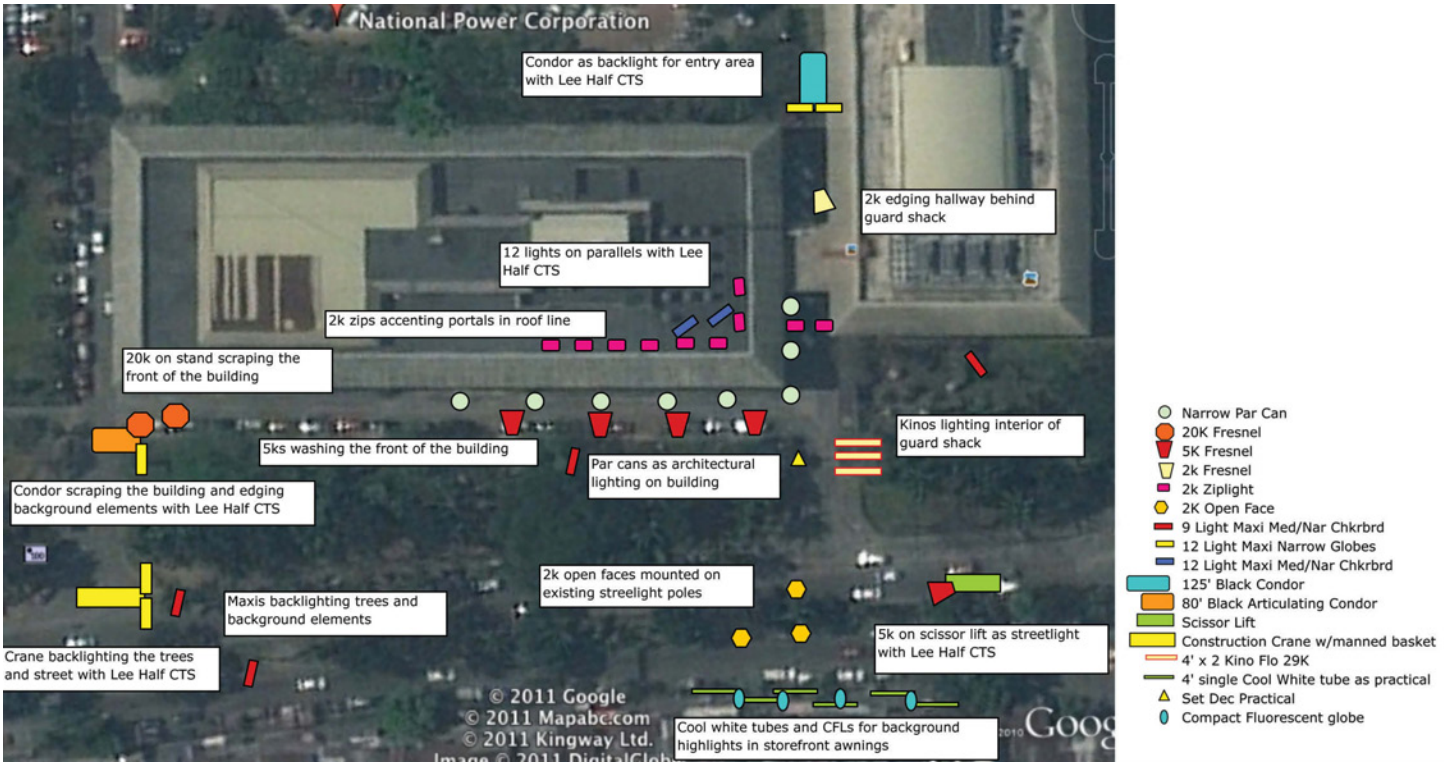
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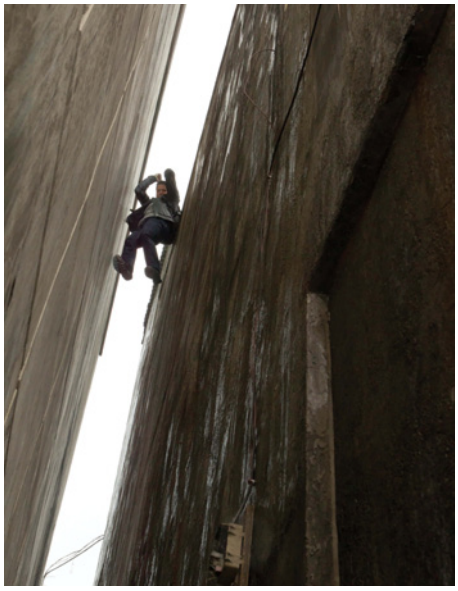




Top: A lighting diagram provided by Geryak shows the production's strategy for the exterior of a Manila building selected to serve as a pharmaceutical factory. Bottom: Interiors for the same sequence were shot inside the massive *New York Times* printing plant in the College Point area of Queens, New York.

Andy Day, shooting inside the set for the three-story house required some complex lighting. "That was certainly the most challenging set we had," says Elswit. "In the film, the house is surrounded by woods, and I felt that even if we had enough decent backings, there was no practical way to light them outside the set while lighting the interior at the same time. My solution was to use greenscreen beyond all the windows; it was not a solution initially welcomed by the producers, but, to their credit, they agreed to it when they saw we would be able to work more efficiently — and, more importantly, create a more believable sequence. Visual-effects supervisor Hal Couzens [working with Double Negative] did a wonderful job in helping to blend the background plates and interior lighting." (*Legacy* has about 800 visual-effects shots.)

During the battle in the house, some shots pan past a window, down a hallway, through a door and out another window. Elswit notes, "The windows were large, with no coverings, and because it was a day scene, we wanted it



Cross leaps into a narrow crevice between two buildings in Manila.

to feel as though all the rooms were lit by the ambient daylight coming through the windows. So Andy and key grip Rich Guinness [Jr.] built eight large box lights to hang outside the windows. We used 1/4 CTB on those units to slightly raise the color temperature."

Day adds, "Each of the box lights had 12 6K space-light hoops inside. We wanted to create soft, ambient daylight, so we combined them with thick diffusion. Those units were used primarily for lighting the first level of the three-story set.

"When we weren't looking at the greenscreens, we would bring in large bounces with lots of light aimed into them," Day continues. "It was supposed to be an overcast day, so within the set, we augmented that look with lots of Kino Flos and [Lowel] Rifa lights. The Rifas come in several different sizes, and we carried the whole line. They're easy to set up and break down, and they provide a great quality of soft yet directional light."

As the action ramps up inside the house, Cross runs full-bore through a spacious atrium to avoid automatic-weapons fire, with panes of glass shattering all around him. Day's crew lit the action from above with soft boxes, and Rowlands credits the Grip Trix, as well



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Natural Bourne Killer







Top left and right: Cable-mounted camera rigs and a crane-mounted remote head were used to capture portions of an extensive rooftop chase in Manila. Rigging work for lights and camera took weeks to prepare before shooting started in Manila. Bottom: Supported by safety cables, Renner and Weisz perform another stunt.

as key grip Guinness and dolly grip Jeff Kunkel, with allowing Renner's run to be captured without slowing the actor or the choreography. "We had to move the camera as fast as Jeremy was moving," Rowlands recalls. "To help us go that fast, the crew took out a side wall along the back porch so we could run the Grip Trix from one end to the other as quickly as we could and then stop within a foot or two of the fire lane. I operated with a Libra head, and Guinness and Kunkel made it work — one steered and one accelerated. When we do Steadicam or handheld chase sequences, I have to totally trust those guys."

The action eventually spills down into the basement. For that portion of the sequence, the production secured a real basement in a home on Long Island. For certain exteriors and pyro work, the filmmakers also shot at a house in Staten Island. To capture shots of Cross scaling the side of the house, the crew managed to wrangle permission to shoot briefly outside the Hudson Valley home that originally inspired them.

One of the crew's tasks was to help bridge Cross' climb up the exterior on location with his entrance through a third-story window onstage. Elswit explains, "At the climax of the house sequence, we wanted to follow Jeremy in one shot as he climbs out of the basement, scales the side of the house, enters the window and fires his gun at someone on the floor below. We wanted the camera to follow him the entire way, ending up over his shoulder. To do this in what appears to be one shot, Rich Guinness and his rigging crew set up a 30-foot platform on location that allowed us to use a 50-foot Technocrane for the first part of the climb. We followed Jeremy up the side of the house using the Technocrane and then pushed into the window. Later, on our stage set, Rich and the crew set up a three-story platform from which we could use a 30-foot Technocrane to match the size and distance of Jeremy's entrance through the window; we then followed him the rest of the way into the set, ending over his shoulder as he fired his gun.

"Visual effects were used to blend the two shots as Jeremy passed through the window," the cinematographer

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Natural Bourne Killer



A variety of special vehicles and rigs, including a specially equipped bus (top) and Go Mobiles (middle and bottom) were used to execute portions of the movie's complex motorcycle-chase sequence, designed by second-unit director Dan Bradley. The prop dummies on the motorcycle (top) were used for safety reasons in a portion that was augmented with visual effects.





continues. "To facilitate the blend, I felt it was important to get the color temp and light level on the set as close as possible to the values we'd had on the exterior location. Making the set bright enough required four 18K Arrimax units bouncing into muslins 15 feet above the top of the set."

Another major set in the New York area was situated inside the massive *New York Times* printing plant in the College Point area of Queens. The facility's large production floor was transformed into a pharmaceutical manufacturing plant, where the filmmakers shot a scene with 400 extras each morning for several days. To light the space, they relied primarily on the facility's existing sodium-vapor and metal-halide lighting fixtures. "We were largely balancing to the existing light," Day confirms. "Because there were so many fixtures, it would have been cost-prohibitive to change them all out."

Day explains that during the scene, "Jeremy and Rachel's characters are trying to escape from the manufacturing facility. They're pursued by security and Jeremy shoots out a lighting control panel on the factory floor. It was a big job coordinating with the electricians at the facility to create a 'lights off'

cue from several different control panels."

Principal photography for *Legacy* extended far beyond New York to include locations in Manila, in the Philippines; Alberta, Canada; and, briefly, South Korea. The schedule, budget and logistical requirements of the shoot required Elswit to take the unusual step of selecting a gaffer for each of the three major locations: Day in New York, Burton Kuchera in Alberta and Cory Geryak in Manila.

"We had to have a lot of equipment in Manila for both the first and second units — we were going to need huge cable rigs on the rooftops," Elswit explains. "Having someone on the ground there who could move all that equipment in and make sure it got rigged properly was important. I did the location scout and preliminary scouting in Manila with Cory [in late 2011], and then I left to start the shoot in New York. Cory returned to Manila [in January 2012] and got everything ready. By the time I got to Canada, we were ready to pre-light and go right to work in Manila."

Geryak says the biggest overall challenge of the Manila shoot was simply "coordinating the shifting of gear. We tried to bring in enough gear that we could light two locations at a time and then leapfrog the equipment to another location for another day. There were only two or three Condors available to us [at a time], and we built a steel cage off a construction crane, so we worked our lighting plans around those limitations. We would shoot in one location and then move the lifts to a different part of the city the next night. It was a challenge getting them wrapped at one location, transported through a congested city and re-rigged at the new location in the same day, but we had no choice."

The second unit, led by Bradley (who also directed the second unit on *Supremacy* and *Ultimatum*) and cinematographer Paul Hughen, was also crucial to the work in Manila, where they executed the film's climactic rooftop and motorcycle chases. The rooftop chase sequence involved stunts on buildings, in alleyways and on the teeming streets of Manila's San Andrés district; for one piece of the action, the production also manufactured an alleyway built to be only 18" across in one section.

Gilroy points to Bradley's contributions to these sequences as a prime example of the underappreciated art of second-unit work. "Dan Bradley was crucial," the director says. "We sat down together about 10 months before we started shooting. I explained that I wanted a motivated relationship with him, unlike some experiences he might have had where he went in as a hired gun. I wanted to do it shoulder to shoulder. I told him the bad news was that he wouldn't have his own show to run, but the good news was that we would have



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Natural Bourne Killer



Gathering to film a scene are (from left) gaffer Andy Day, 1st AC Baz Idoine, 2nd AC Beka Venezia, script supervisor Dianne Dreyer, Elswit, prop assistant Anthony Baldasare, actor Stacy Keach, director Tony Gilroy, camera operator Andrew Rowlands and 1st AC Tim Metivier.

extended time to plan it together, and I would give him credit for it. He laid the whole thing out for us. I had never [directed] action before this, and the complexity — the engineering that goes into building those unique rigs — is amazing. Pulling off something like [the motorcycle chase] is an interesting combination of physics and imagination. Working with Dan was highly educational."

Gilroy adds that the chase takes place in "four chapters" throughout Manila, exploding out of the San Andrés slums and eventually concluding in the massive transportation center known as the MRT Metro Manila Station. Shooting in a location that Gilroy compares to "the chaos of Times Square" essentially required the filmmakers to "work in the real world and blend our people into it."

Most of the chase was done practically, with only a handful of digital enhancements, such as face replacements for stuntmen. Renner and Weisz did much of the riding and some of the stunts for the sequence, so the filmmakers used long lenses when they could to show the actors' faces. Hughen adds, "Dan wanted to keep the camera moving, so even the crash cameras and the Canon 5Ds that we used were attached to vehicles or mounted on the hoods of cars and trucks. Sometimes the operators were asked to pan onto the action at the last second — that element of surprise fit well with the *Bourne* style."

Hughen also notes that the Go



Mobile system was "our workhorse on the second unit. With a 15-foot Technocrane and Libra head mounted on its back, we were able to run through traffic, sometimes up to 50 miles per hour. Standing by were three handheld cameras and the camera bike for each shot we were involved with." The second unit typically ran five operated cameras and, frequently, two or three more rigged cameras, including Eyemos and Canon 5Ds planted in strategic locations for fights and crashes.

Elswit emphasizes that despite the traditional filmmaking tools on the project, two particularly modern conveniences helped the filmmakers put *Legacy* together. The first was Universal's decision to allow them to put their dailies onto iPads. The cinematographer concedes that the move remains "somewhat controversial, since everyone prefers [secure online] systems. But we were traveling so much that we needed access to the whole movie, which I had on two iPads. I carried them with me everywhere, and they were an important reference not just for the story's themes, but also for matching back and forth as we went from one location to another. That was really useful."

The other convenience was the digital intermediate, a process the filmmakers were still finessing when they spoke with *AC*. "The big problem with this much material [taking place] outdoors is matching it all — time of day, weather, color," says Elswit. "The chase sequence is about 10 minutes in the movie, but it was shot over four weeks. Some shots were done in shade, some were in the morning, some were in the afternoon, and so on. The DI can help you pull all of that together.

"I also needed alpha channels to pull apart the composites," the cinematographer continues. "It can be really tricky trying to connect ambient light coming through windows with plates that were shot a few weeks later at a real location. Without a DI, it wouldn't be possible to marry those values together so that they look like they exist in the same world. When I color-time a project with a guy as talented as [Stefan Sonnenfeld], I can have mattes, take the background out of the window, and play with it all a bit. I have more control and more freedom." ●

TECHNICAL SPECS

2.40:1

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Around the World in 65mm

Director/cinematographer Ron Fricke captures stunning large-format images in 25 countries for *Samsara.*

By Iain Stasukevich

•|•

Filmed over a period of five years in 25 countries on five continents, *Samsara* falls into the category of what director and cinematographer Ron Fricke once called "impossible films — non-verbal films that sustain themselves only on images and music." *Koyaanisqatsi* (1983), directed by Godfrey Reggio and photographed by Fricke, proved that such a film was possible, and Fricke continued exploring the concept with partner and collaborator Mark Magidson on *Baraka* (1992). Like its predecessors, *Samsara* paints a powerful picture of the interconnectedness that links the world's sacred grounds, disaster zones, industrial complexes and natural wonders.

Fricke describes *Samsara* as "more urban, more about people than *Baraka*. We didn't have what you would call a script. I like to think of it more as a guided meditation, and *Samsara* is a meditation on cycles: birth, death and rebirth."

Fricke and producer/co-writer Magidson were keen to return to the 5-perf 65mm format they used for *Baraka*, but the 24 fps-capable Todd-AO AP 65 camera systems





Opposite: Chinese dancer Tai Lihua performs the "1,000 Hands Goddess Dance" in *Samsara*. This page, top: The film opens with three Balinese girls made up like traditional Tari Legong dancers. Bottom: Director/cinematographer Ron Fricke filmed views of the Temples of Bagan in Myanmar from the basket of a hot-air balloon.

employed on that film were no longer available. Seeking to explore the possibility of a digital approach to image capture, they brought on ASC associate Chris Reyna to help locate a suitable camera system. "We started looking at film and digital cameras, but in 2006 we had only one 4K option: the Dalsa Origin," says Reyna. "Based on our testing, the Dalsa offered good image quality, but Ron didn't like it because it was too big, and I didn't like it because it was still too prototypical. I knew we could do better."

Magidson adds, "When you go to 25 countries, you want to bring back the material in a format that's going to stand the test of time. Digital was just not there when we started. But shooting film and moving it in and out of so many locations has its own set of problems."

The filmmakers turned their attention to finding a suitable 65mm film camera. They still had Fricke's custom-built 65mm motion-control system to shoot time-lapse sequences, and soon learned of the five 65mm cameras housed at Panavision's Woodland Hills, Calif. complex: two Panaflex System 65 studio cameras, and three high-speed 65mm HR Spinning Mirror Reflex cameras, commonly known as HSSMs. It was the smaller, lighter high-speed cameras, with their 500' magazines and wide range of frame rates (2-72 fps), that Fricke sought.

Panavision service technician Ken Barrows recalls, "The cameras hadn't been rented in a long time, so they were basically in pieces, and I had to put them back together. It was a matter of fitting parts together until I had one complete camera, and then I started working on the second and third cameras with the remaining parts."

The three HSSM cameras were hand-built in 1959 using high-speed Mitchell movements from the 1930s. Since then they had been extensively modified, particularly the viewfinding system; the cameras' original parallax finders were swapped out for a spinning-mirror reflex system, newer electronics and a

Photos by J.C. Earle and Mark Magidson. Frame grabs courtesy of Oscilloscope.

Around the World in 65mm



Fricke (at viewfinder) films monks crafting an intricate sand mandala inside the Thiksey monastery in Ladakh, India. Assisting Fricke is J.C. Earle, who also served as *Samsara*'s gaffer, grip, associate producer and assistant editor.

standard-definition video tap. For *Samsara*, Barrows assembled an orientable viewfinder with extra parts from around the office. "I just put the parts together, and then [Panavision optical engineer] Dan Sasaki came along and made everything work perfectly," he says.

Sasaki also refurbished a complete set of Panavision 65mm prime lenses and retrofitted Fricke's Schneider Variogon 140-280mm f5.6 medium-format zoom lens with a 65mm Panavision mount. (The aperture scale of the still lens was not converted to T-stops.)

The opportunity to shoot 65mm was worth the time and effort. "Because there are no actors, the image becomes the main character," says Fricke. "We wanted to capture the essence of the people and places we were photographing, and a 65mm camera is the best tool to do that." Principal photography began with Kodak Vision2 500T 5218, 250D 5205 and 50D 5201 film stocks; the filmmakers switched to Vision3 500T 5219 and 250D 5207 when those negatives were introduced.

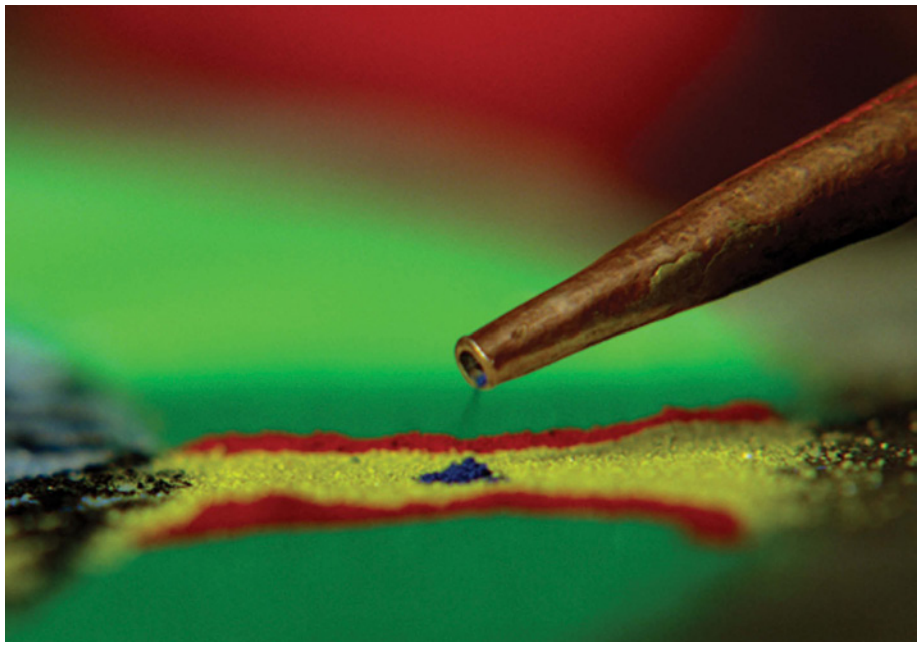


A visual motif of *Samsara* is a shot in which the subject stares into the camera lens, unspeaking and often unblinking, for so long that the viewer may begin to question who is watching whom. "All of the portraits are stylized after the great still photographers that I love, like Yousuf Karsh, Irving Penn, Mary Ellen Mark and Annie Leibovitz," says Fricke. "Something is revealed in their portraiture, and when a person stares into the camera, if you're lucky, you can get the essence of who that person is."

> "We wanted to capture the essence of the people and places we were photographing, and a 65mm camera is the best tool to do that."

The film opens with a striking close-up of a young Balinese girl costumed and painted with the makeup of a traditional Tari Legong dancer. Fricke, who prefers to shoot with natural light in the subject's natural environment whenever possible, photographed her hypnotic dance in a school courtyard in the small Balinese town of Ubud.

"That was mostly natural light, with a little bit of grip to bounce here and there, but [the approach was] very minimalistic," says 1st AC J.C. Earle, who also served as gaffer and grip when the situation called for it, as well as associate producer and assistant editor. "Ron and I placed the dancers under an eave so they received a soft, natural front light from the clouds. Of course, the challenge with natural light is that it changes, so if you watch that scene closely, the contrast ratio moves around."



A close-up detail of the instrument the monks use to craft their sand paintings.

Although Fricke favors the modified Schneider 140-280mm zoom for portraiture, its slow f5.6 aperture prevented him from using it on this particular scene, which was photographed on a cloudy day with the 250D stock. Instead, he relied upon the workhorse Panavision 65mm prime lens package, comprising 50mm, 75mm, 100mm and 150mm lenses. Earle notes, "You can spot the Schneider lens in the film because the zoom gives you the feeling of movement, like the portrait of the Himba woman in Namibia — when it pushes in, that's the Schneider. For it to be sharp, you want a stop of at least f8, and ideally an f11, so we were only able to use that lens for really bright exteriors."

Pulling focus while wide open and at close focus on the 65mm-format lenses was a good challenge for Earle. "On the longer focal lengths, the depth of field can be as small as a couple of millimeters," he says.

One of Fricke's favorite portraits — a shot of Marcos Luna, an ex-gang member living in Los Angeles — also became one of *Samsara*'s most revelatory moments. "We went to his apartment thinking it was going to be another 'stare into the lens' kind of setup," says Fricke. "We put the Panavision camera [with a 50mm lens] on the mo-co dolly, with the jib arm and the pan-and-tilt head. The idea was to move over the top of his head and move down his face to find his eyes, but when his wife placed this beautiful baby girl in his arms, he began rocking back and forth, kissing and cuddling the baby. The 'Tattoo Man' became 'Tattoo Daddy,' which transformed the portrait into something really wonderful." A 12'x12' silk was rigged overhead to soften the light falling on

Around the World in 65mm







Top: Moonlight plays across the faces of beheaded statues on Nemrut, in Turkey. Middle: Producer/co-writer Mark Magidson helps set up the 65mm motion-control system used to capture this time-lapse sequence. Bottom: Fricke (left) and Earle ready the Panavision 65mm HSSM camera at the location.

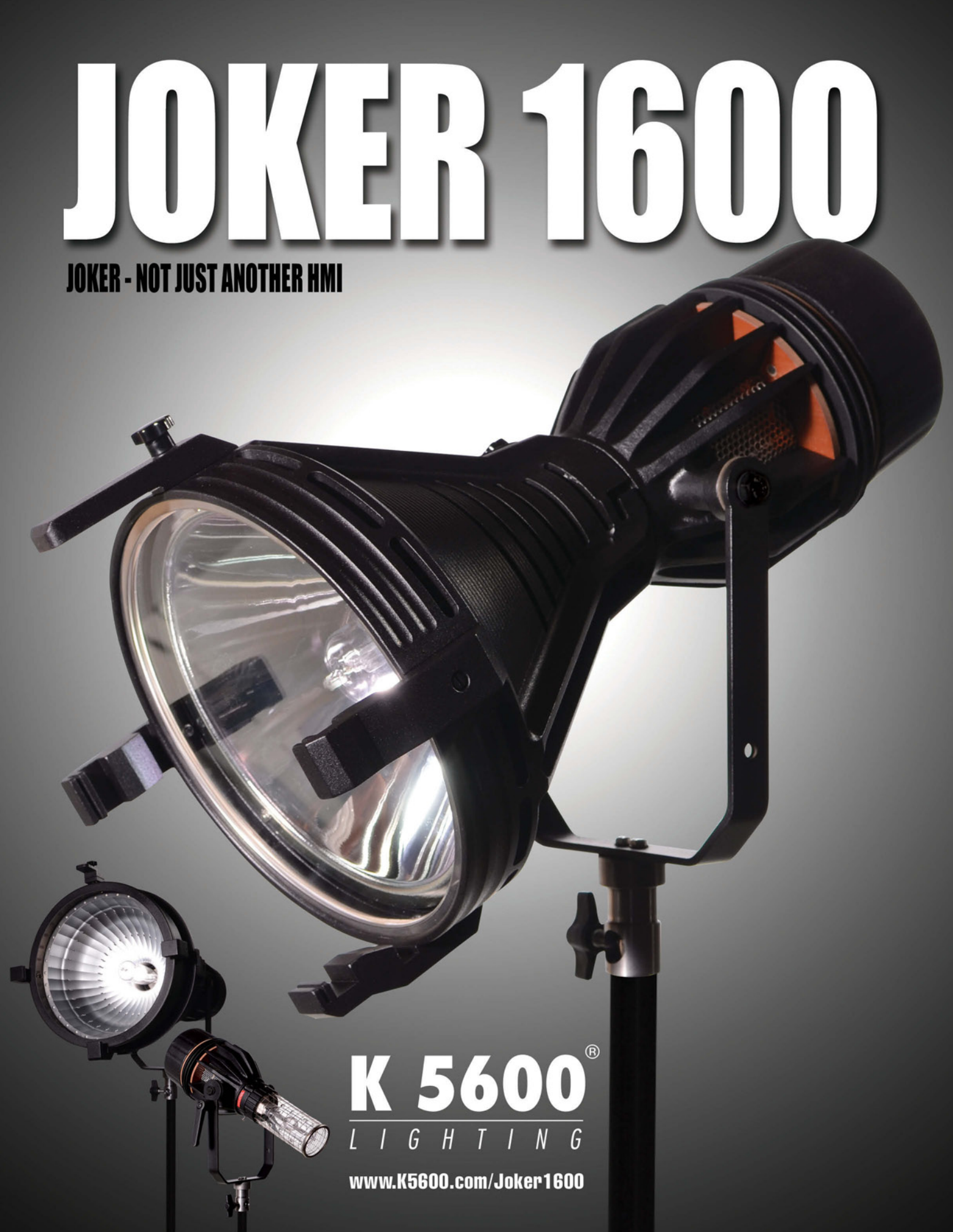
Luna, and flags were placed close in for negative fill.

Some of the portraits required more artificial lighting, such as the "1,000 Hands Goddess Dance," which was performed by renowned Chinese dancer Tai Lihua at a studio outside Beijing. A local Chinese crew was on set to help capture the sequence. "It's a performance, so it had to look more theatrical than any of the things we photographed under natural conditions," says Fricke. Earle bounced a tungsten 10K off a 20'x20' UltraBounce for the key light while 800-watt Joker Bugs provided hard, blue kickers from both sides of the frame. Carefully placed LEDs helped break up the inky background with tiny blue bokehs, which resemble small stars in the distance.

In another striking sequencee, "Transfiguration," French performance artist Olivier de Sagazan starts off as a well-groomed man sitting behind a desk but uses handfuls of clay and mud to transform himself into a horrific, gasping monster. Fricke and the crew traveled to de Sagazan's home on the north coast of France, where a covered stage was set up in the artist's backyard; the skylights were blacked out and Earle set up two Joker Bugs with Chimeras: an 800-watt unit to create a 3/4 frontal

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Fricke (bottom photo, left) and Magidson prepare a shot inside the Hall of Mirrors at Versailles.

key, and a 400-watt for a backlight.

"[De Sagazan] would do two performances for us to film, both of them non-stop with no cuts or breaks," Fricke explains. "We knew he was going to go berserk at some point, throwing clay and mud everywhere. We loaded up the A camera with our only 1,000-foot magazine; as we pushed in on the dolly, I could see his face alter, and then I would give the cue to change lenses. The crew changed the lens, reset the stop, focus and dolly position in under six seconds, and then we continued to push in for the close-ups."

The dolly, pan/tilt head and Intel-A-Jib were three components of a larger motion-control system designed by the cinematographer, with some fabrication help from Magidson's Culver City-based Moldex-Metric, Inc., and software support by Smart Engineering Systems in Carlsbad, Calif. The dolly uses a stepper-motor-driven rack-and-pinion system to pull itself down a gear belt built into the lightweight aluminum track; it was designed for motion-controlled time-lapse photography, but Fricke often used it as a real-time dolly for the Panavision camera. Additionally, Fricke and Magidson reengineered an Intel-A-Jib to support the weight of the Panavision HSSM and take orders from the motion-control brain, a flight case with the stepper drivers for the dolly, pan, tilt and jib controls.

The centerpiece of the system is a custom-designed 65mm motion-control camera, the second generation Fricke designed to create his signature time-lapse sequences. The first camera was fabricated by Moldex-Metric, Inc. to shoot the 5-perf 65mm format for *Baraka*, but it could also shoot 15-perf 65mm. "[You] just flop it over [horizontally] to do 15-perf, then change the aperture plate and stand it up to do 5-perf," he says.

Fricke himself built the second version of the camera for *Samsara*, assembling it with a mix of custom-designed parts and pieces from other cameras. To create a 65mm magazine for the camera, Fricke took two 400' Arri III 35mm magazines, chopped the back off one and welded it to the



This frame grab shows one of a number of baptisms photographed for the film. "*Samsara* is a meditation on cycles: birth, death and rebirth," says Fricke.

front of the other. Both generations of the camera are controlled by the same program that operates the motion-control system; when shooting, Magidson was usually found at the computer interface while Fricke remote-operated the camera.

> "I love shooting time-lapse because it gives you these extraordinary perspectives on very ordinary things."

Some of the most striking images in *Samsara* were time-lapse sequences captured by the motion-control system, including moonlight crossing the faces of beheaded statues on Nemrut, in Turkey; the night sky spinning through the branches of a dead acacia tree in the Namibian desert; and the setting sun caressing the facade of Al Khazneh, in Petra. "I love shooting time-lapse because it gives you these extraordinary perspectives on very ordinary things," says Fricke.

The speed of the time-lapse shot is usually determined by the subject or the action, "but it's hard to have a general rule," says Earle. "Sometimes it's determined by how long we're in a location. For the night shots we used a 1-minute exposure, so the length of the night determined the length of the shot. You need the right weather conditions for clouds, sunrises or sunsets, and you have to shoot at the right frame rate."

"The mo-co gave us a really important creative element to combine with the more standard frame-rate footage," says Magidson. Despite Fricke's affection for the effect, only about 10 percent of *Samsara*'s running time comprises time-lapse cinematography. "We engineered an interface between the Panavision camera and the mo-co system, bringing a wider range of frame rates and lenses to the palette," says Earle.

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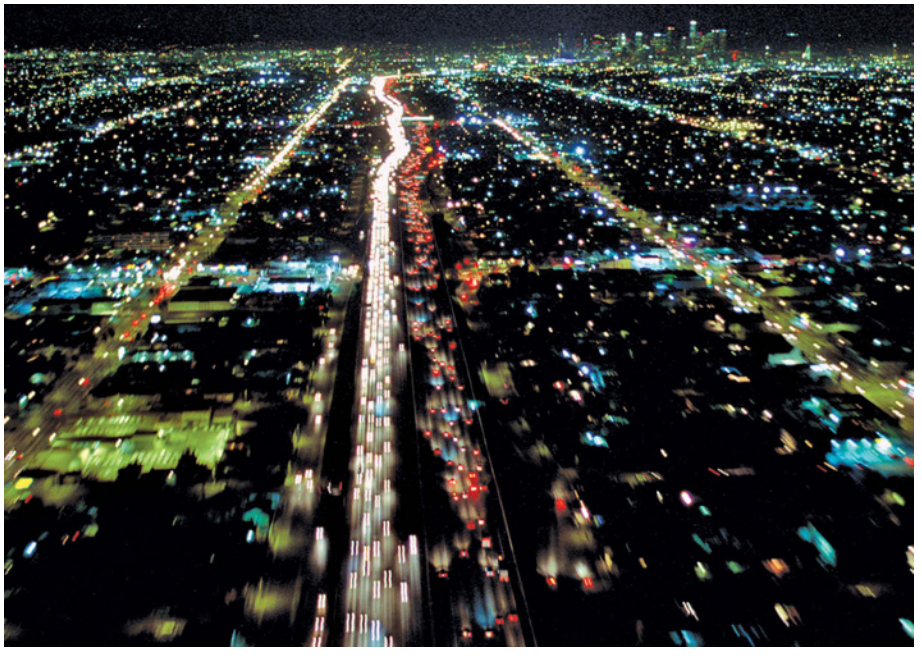
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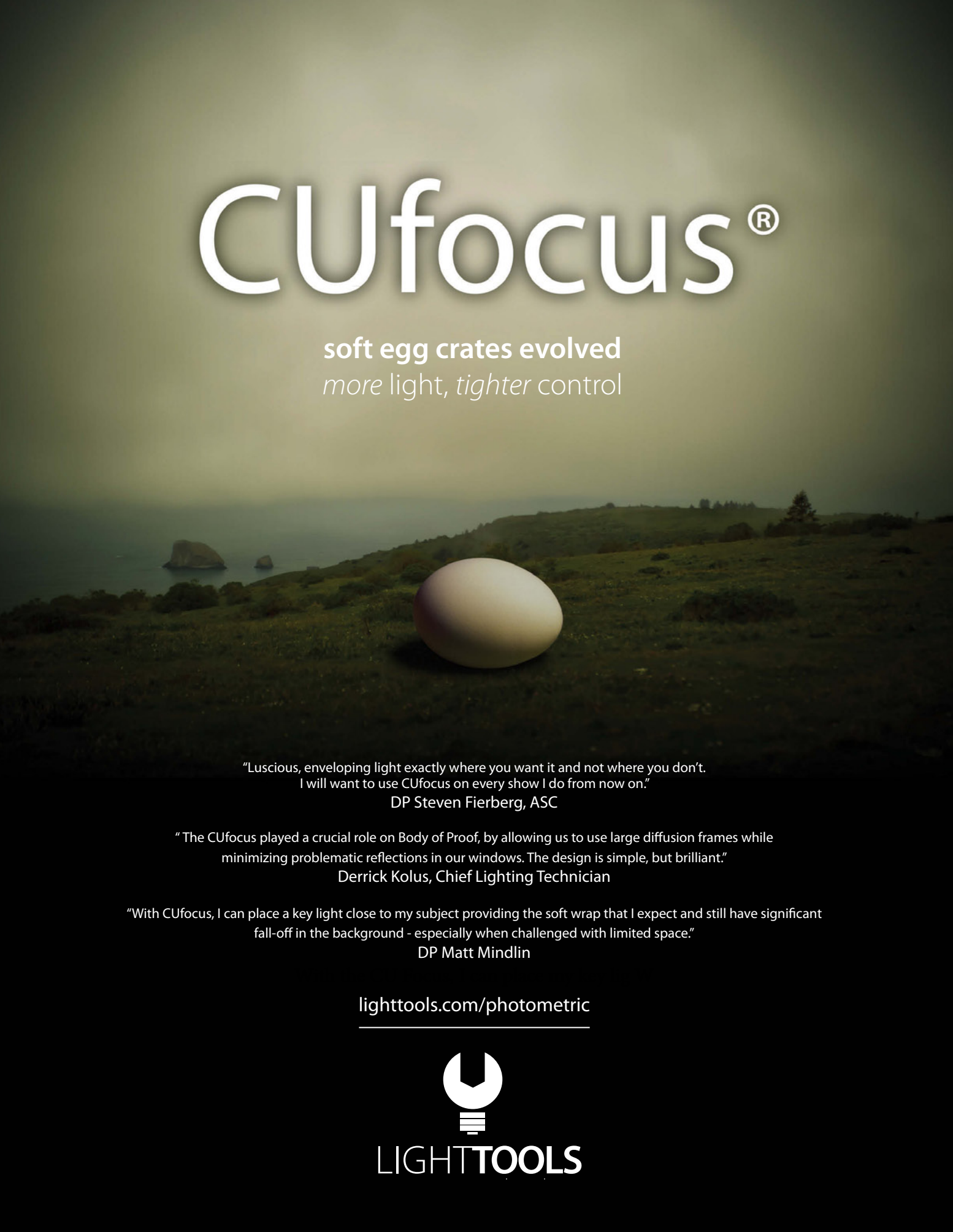
Top: The night sky spins through the branches of these acacia trees during a time-lapse sequence filmed in the Namibian desert. Bottom: A nighttime time-lapse sequence over Los Angeles was shot from a helicopter with a Gyron mount from Nettman Systems.

Smart Engineering Systems created a manual relay switch on the motion-control box that triggered a modified Norris intervalometer on the Panavision HSSM, allowing it to function in time-lapse mode or run at continuous speeds from 2 to 72 fps (although the filmmakers rarely ran it above 48 fps) versus the motion-control camera's 1 fps maximum frame rate. The widest lens available for the custom motion-control camera is a 30mm f3.5 Hasselblad fisheye, "and Ron didn't like the fisheye look," Earle remarks. "Panavision's 24mm T3.5 rectilinear wide-angle ended up being our favorite lens."

In deciding where to shoot, accessibility was a key consideration for the filmmakers, as many of the locations were either physically difficult to reach or endure, or were otherwise off-limits to outsiders. Nevertheless, "we picked the places we did because you'll always come back with great stuff," says Fricke. Local production companies often coordinated with Fricke and Magidson to scout, cast, facilitate access to a location, or supply additional crew.

On the first leg of production, Fricke and Earle travelled to Mecca with the intent of photographing Muslim pilgrims and their circumambulation around the ancient Kaaba during Ramadan prayers. "Accessing that location took more than a year," says Magidson.

Fricke enthuses, "It's just the most amazing event. There must have been four million people there in and around the mosque." The filmmakers found themselves with the motion-control and Panavision cameras atop a



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LIGHTTOOLS

Around the World in 65mm





Top: This tattooed couple was among the many portraits taken for the film. Fricke muses, "When a person stares into the camera, if you're lucky, you can get the essence of who that person is." Bottom: French performance artist Olivier de Sagazan sits at a desk before transforming himself into a mud monster in the "Transfiguration" scene.

new hotel/apartment building right next to the Sacred Mosque. However, the vantage point was reserved for a powerful family, and the production's local fixer had failed to gain all the necessary permissions to film there.

"I humbly said to [the sheik] that what was happening here was so beautiful that the whole world should be able to see it," Fricke recounts. "He said, 'You're welcome to stay and film after prayer time.' I don't know if I was being a good diplomat or not, but I nearly jumped off the building when he said that. I was really afraid of losing one of the best sequences of the film." Fortunately, without having to jump, Fricke was able to reach an agreement with the family and get the shots that appear in the final film.

There were also physically demanding locations, such as Ladakh, India, where the crew braved freezing temperatures and a 12,000' altitude to reach Thiksey monastery, where they filmed monks crafting an intricate sand mandala. "Then we almost gassed ourselves to death in a volcanic sulfur mine in Eastern Java," Fricke adds. "That was pure poison gas. We choked and our eyes burned when the wind changed and blew into our faces."

Far removed from the hell of the sulfur mines were the majestic Temples of Bagan in Myanmar, which Fricke filmed from the basket of a hot-air balloon. Aerials over Los Angeles were shot from a helicopter with the Panavision HSSM on a Gyron mount from Nettman Systems, undercranked at 1½ fps, which Fricke calls "my favorite

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Top: Workers navigate a volcanic sulfur mine in Eastern Java. Bottom: The student body moves as one at the Tagou Wu Shu Academy in Zhenzhou City, Henan Province, China.

continuous time-lapse frame rate. It's also great for filming clouds."

"The fact that the cameras ran as long and steady as they did under those conditions is a real testament to their engineering," says Reyna. On the rare occasion a Panavision camera did go down, it was up to Fricke and Earle to make their repairs in the field, without technical support or even a manual to guide them. Some breakdowns weren't detected until after the fact; for example, in Israel, a part came loose inside the Panavision HSSM, "and when we opened up the camera, there were flecks of ground metal inside the body," says Earle. "The camera had been running at high speed with a loose part, grinding itself down, but the film still came out fine!"

The film crew primarily consisted of Fricke, Magidson, Earle, 2nd assistant Alex Falk (or a local assistant in his absence) and line producer Myles Connelly. Operating with a minimal location crew slowed the filmmakers down in some ways — particularly when there were two or more cameras to set up — but it was also an advantage when they needed to get in and out of a location quickly, like in Hawaii, where the entire trip lasted all of 18 hours. "There's a speed and efficiency that comes with a small crew, but you really have to manage the effort, because if you lose one guy, you're really in trouble," says Connelly. "Everyone's working flat out all the time, wearing multiple hats and constantly being exposed to extreme conditions." After landing at a given location, Fricke might spend most of his time looking for a single shot, then only roll one take, "and if that was the take, he's ready to move on," Earle remarks.

"When you're out shooting for years, like we did for *Samsara*, you get a feel for where to put the camera," Fricke explains. "You can pre-see it. If you're not feeling it and you're not seeing it, then don't shoot it."

The cinematographer's senses

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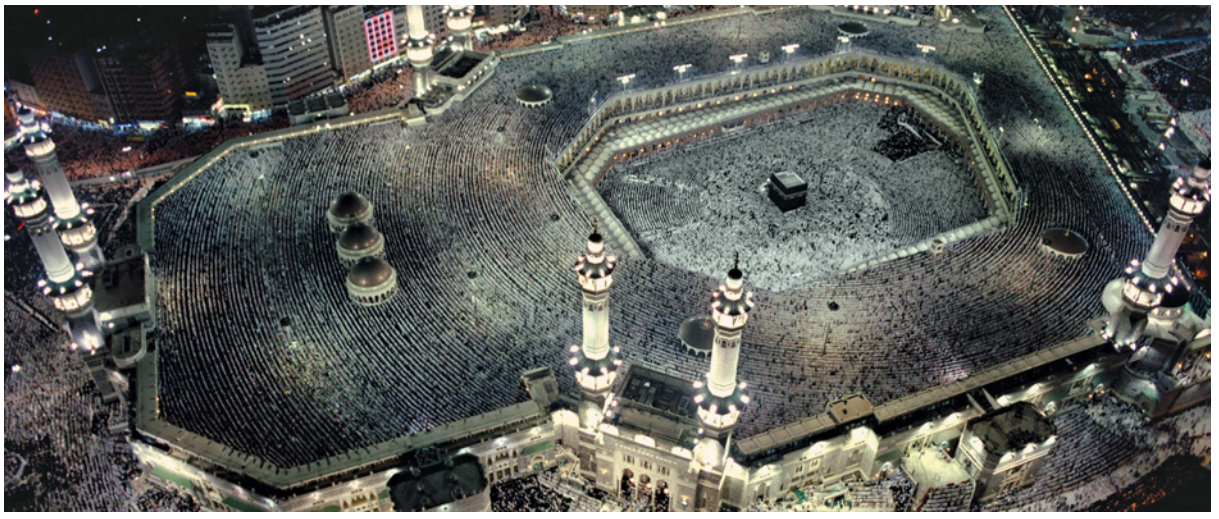
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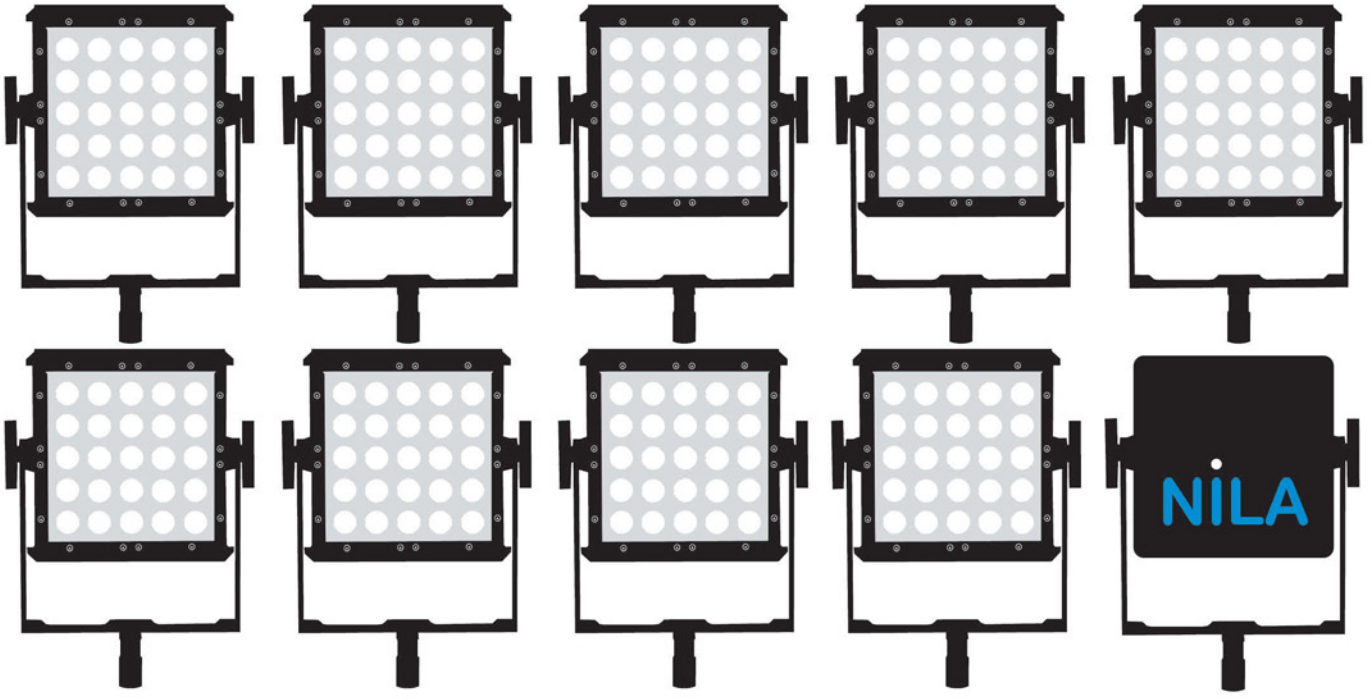
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Around the World in 65mm



The filmmakers photographed this high-angle view of Muslim pilgrims in Mecca from the vantage of a hotel next to the Sacred Mosque.

were finely tuned enough to bring more than 20 hours of footage to the editing room in Los Angeles. FotoKem in Burbank transferred the 65mm negative at 1920x1080 resolution on a Cintel Millennium datacine for the offline edit. Fricke, Magidson and Earle cut the film using ProRes 422 HQ media in Final Cut Studio 2 before sending their EDLs back to FotoKem, where 65mm selects were digitized at 8K on an Imagica 12K Bigfoot 65mm scanner in the first step of a post workflow modeled after *Baraka*'s 2008 restoration. The 8K files, at 200MB per frame, were backed up and simultaneously downrezzed to 4K for visual effects and cleanup work. According to Reyna, the only times 70mm prints were struck from the original camera negative were for the "definitive doublecheck" for vignetting and focus in selected shots.



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FotoKem's Digital Film Services department; its subsidiary, Spy Post; and Venice, Calif.-based Griffiti Studios used a variety of tools, including Apple's Shake, Blackmagic Design's DaVinci Revival and Autodesk's Inferno, to stabilize aerial shots, smooth and paint out time-lapse artifacts, and dust-bust. Colorist John Persichetti performed the 4K digital intermediate on a FilmLight Baselight at Sony Pictures Colorworks in Culver City.

Fricke and Magidson agreed early on that there wouldn't be any 70mm prints of *Samsara*, and even though FotoKem would strike a number of 35mm film prints from the 4K master, 4K digital projection was deemed the best means of screening the film. "We knew that when we finished the film there wouldn't be a lot of 70mm-capable theaters where we could show it," says Reyna. "Digital [projection] was the appropriate technological and aesthetic choice, especially since there are now more than 11,000 4K-capable theaters in North America alone."

"Even though [this is] not an effects film, bringing the footage into a digital realm allowed us to do things we just couldn't do in film, and when you scan at 8K all the quality of the large 65mm negative is contained in the digital file," says Magidson. "Basically, we've taken a 50-year-old camera system and combined it with cutting-edge digital technology. It worked for us because of the nature of this kind of filmmaking. From the very beginning we wanted the highest quality, most beautiful images we could possibly make." ●

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Hair-Raising Heroics

Tristan Oliver helps to create a live-action sensibility for *ParaNorman*, a 3-D stop-motion feature about a bullied boy who saves his town from a witch's curse.

By Rachael K. Bosley

•|•

U.S. animation studio Laika attracted attention for breaking new ground with its first feature, *Coraline* (*AC* Feb. '09), and its second, Chris Butler and Sam Fell's *ParaNorman*, advances the 3-D stop-motion-animation genre further still. Written by Butler, the story follows a boy whose ability to communicate with the deceased makes him a social pariah, until everyone in his town realizes he might be the only one who can avert the supernatural tsunami that threatens to destroy the town on its 300th anniversary.

English cinematographer Tristan Oliver traveled across the pond to lead the camera department on *ParaNorman*, his first 3-D feature. He was attracted not only by the script, which Butler has described as "John Carpenter meets John Hughes," but also by the prospect of working with Butler and Fell — he'd been friends with Fell for 20 years, since their freelance days at Aardman. Preproduction and production kept Oliver at Laika's studio in Hillsboro, Ore., for nearly two years, 84 weeks of which were devoted to principal photography.

AC spent a day touring the set near the end of the shoot, and Oliver, who had previously entertained an *AC* visit in England for the *Wallace & Gromit* feature (*AC* Oct. '05), wryly noted, "It's the same the world over, really: a very large shed full of tired-looking people and lots of small things." A





Opposite page: Norman prepares for the daily torment of walking past the other kids to enter school. This page, top: A statue commemorating the Witch of Blithe Hollow towers over Norman and Neal. Bottom: After taking shelter from a pack of zombies, Norman tries to return a wayward ear to its undead owner without attracting attention.

Photos by Reed Harkness, Scott Spiker and Tristan Oliver. Photos and frame grabs courtesy of Laika, Inc., and Focus Features.

few months later, while in Los Angeles to grade the picture at Technicolor Hollywood, he had time to discuss the project in detail.

***American Cinematographer*: On our set visit, Sam and Chris talked about their desire to avoid a visual style that simply 'presented the animation' and instead give this movie a live-action sensibility.**

Tristan Oliver: That was a big attraction for me. We were always given a fair amount of free reign at Aardman to make things look the way we wanted, but there was always the caveat that you had to see the animation, and that tends to flatten things off because you have to put in more light. We wanted the environments in *ParaNorman* to look as they would in the real world. For example, day exteriors look lit by a single sun source, and some interiors look lit only with existing light, with some of the frame very dark and some of it overexposed. Most of our visual references were live-action movies, including *Atonement* [*AC* Dec. '07], *Pulp Fiction*, and the martial-arts movies *Hero* [*AC* Sept. '03], *Crouching Tiger* [*Hidden Dragon*; *AC* Jan. '01] and *House of Flying Daggers* [*AC* Dec. '04]. For me, another reference was *Road to Perdition* [*AC* Aug. '02], which I absolutely love as a movie, and which is spectacular in the way it braves that dark/light juxtaposition.

Several shots use shallow focus to isolate Norman in the frame. That's unconventional in photographing animation, isn't it?

Oliver: Yes. The temptation with animation is typically to try and keep everything in sharp focus, so I'd never been able to work with very shallow depth-of-field and with longer focal-length lenses, and I really wanted to do that. Our inspiration for that was the camerawork in *George Washington* [2000], which we liked for the intimacy the filmmakers achieved with the kids, and the way they used tilt-shift lenses to isolate them in the frame. But I was adamant that we had to keep it very limited as a look because every TV show and every commercial seems to be shot like that now, with extremely shallow depth-of-field banded up the middle of

Hair-Raising Heroics



Cinematographer Tristan Oliver preps some backlight for the main character.

the frame. I wanted to use it in a very specific way, just to emphasize Norman's alienation. There are maybe 18-20 shots that use it, and sometimes the effect is extreme; sometimes only a plane of the face is in focus. Because we were at the macro end of the lens, we were actually working at the sort of stop you'd normally use to achieve a normal depth-of-field in live action, around a T4. In animation, we typically work at T11 or T16!

Did using focus that way complicate the 3-D at all?

Oliver: It's rather frowned upon to do that in stereo, but I found that the rulebook you get that says you have to do this or that with 3-D is actually nonsense. You just have to be careful about how you do some things.

What were some of the other things you had to approach carefully?

Oliver: I did a lot of testing to see what I could do in stereo with the 2.35 frame. This was my first opportunity to shoot animation in 'Scope, which was really lovely. The received wisdom is that stereo works a lot better with a centrally framed, square-looking picture; the idea is that if you want something to come through the screen plane, it has to be free of the constraints of the frame. But we wanted to use 2.35 properly, and we hit a few stumbling blocks along the way. You can frame in thirds very nicely, so we'd often have something, such as a prop, very foregrounded, and then have a character more central to the frame. But we found the items we were using as framing devices would really upset the stereo if they were too near [the screen], because the separation between the left and right eyes gets rather troublesome if you've got something too close. We had to learn ways around that. Sometimes we'd oversize the prop and push it farther back in the set. Eventually, we decided we were happy to let [the foreground object] be an abstract thing rather than a recognizable thing. That's fine, because then your eye is looking where it should be looking.

On set we noticed you were mainly using the same lens package you used on *Fantastic Mr. Fox*, Nikon primes and modified Cooke 5:1 zooms, but you chose the Canon 5D Mark II this time. How did that work out?

Oliver: I shot *Mr. Fox* on the Nikon D3 [*AC* Dec. '09], but I chose the Canon for this because the animators liked the image quality of its HD Live View, which Nikon didn't have at the time. We bought 50 of them. We captured in raw format, and our 2.35 crop [from the 21.1-megapixel 36x24mm CMOS sensor] gave us an image that was over 4K, and that was busted down to 2K for visual-effects work. The Canon's raw file has quite a lot of latitude, and I was able to do a lot with it, but the camera isn't fabulous. We had a lot of problems with density shift and a fluctuating magenta flashing of the chip depending on the temperature in the studio and the shutter speed. Bizarrely, it was that kind of magenta shift you get with film when there are tiny, unidentifi-

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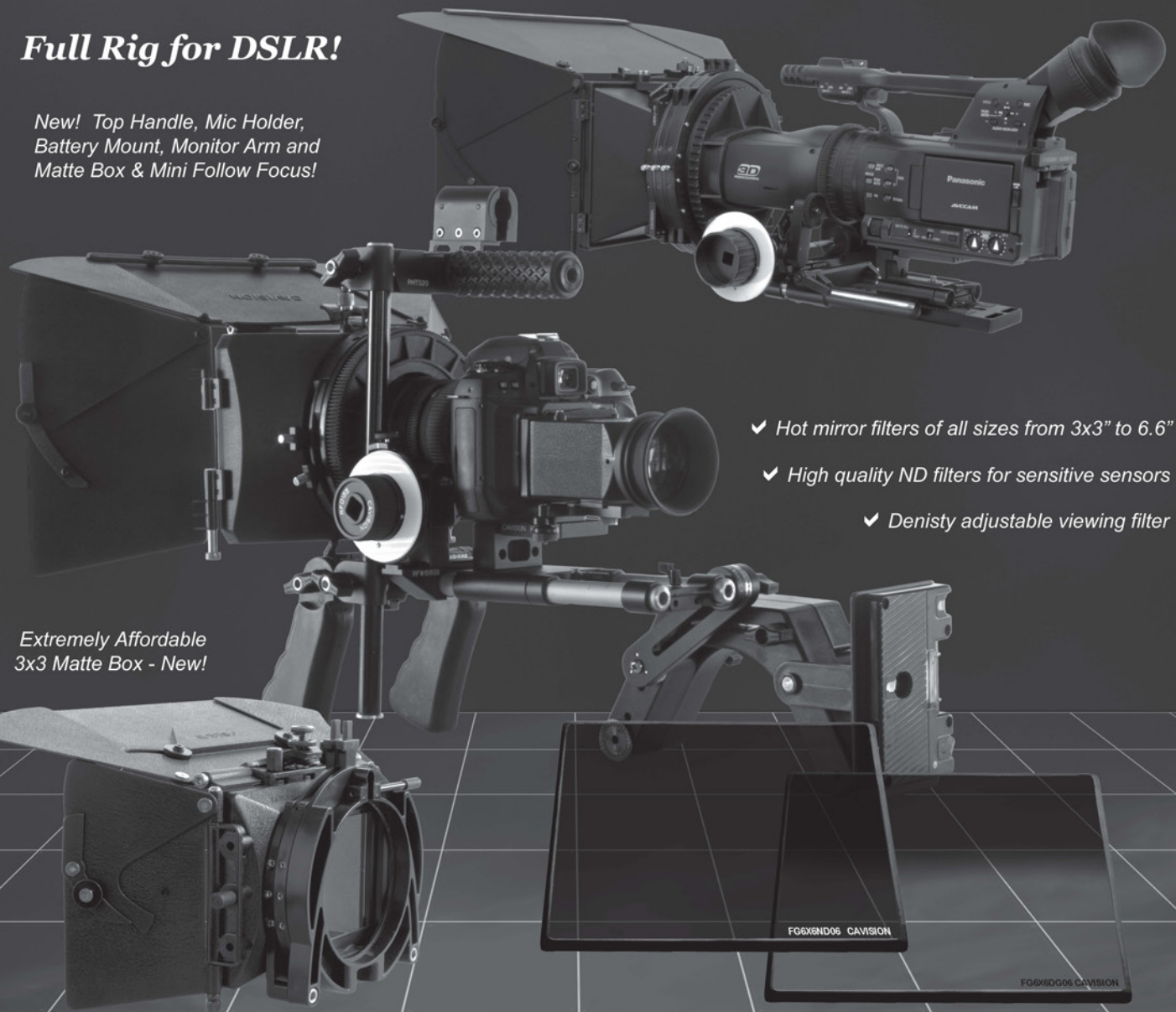
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able leaks in the camera, or if the negative's been a bit flashed before you shoot on it. This was the digital equivalent!

How did you assemble the crew for your first U.S. shoot? Did you bring anyone over from England?

Oliver: I brought my first AC, Gunnar Heidar, from Iceland, and one of my lighting cameramen, James Lewis, from the U.K. They both worked with me on *Mr. Fox*. Stop-frame is a small world, so I worked with a number of familiar faces. I inherited some crew from *Coraline* as well. I had a very, very hard job finding women for the crew. It's the 21st century, and I think it's ridiculous there aren't more women in camera crews, and I also knew that spending two years with an all-male crew in a big, sweaty box could get a bit 'locker room.' I ran a trainee program, which I normally do, and got a couple of women in to work as trainee ACs. They learned very quickly and did a fantastic job. I found the electricians here to be absolutely fabulous — proactive, imaginative and intelligent. I've got good sparks in the U.K., but they're difficult to find, and there's a small group I hang onto very zealously. Our micro-lighting specialist on *ParaNorman*, Matt DeLeu, was brilliant; he managed to source the most fantastic stuff for me. He found a color-correct alternative for the Micro Kino fixtures I used to use by the dozen, which are no longer made, and he also built a set of working miniature HDTV sets for a shot of a storefront. Their screen size was as small as 1 inch, and each of them ran a different clip.

We had 50 shooting units. I'd typically light up to 14 units myself, and I supervised four other lighting cameramen, James Lewis, John Ashlee Prat, Mark Stewart and Chris Peterson, who came on at various points during the shoot. They're all very good, they have





Top: The RGB aura visible on the person at far right in this early color photo, taken by Sergei Mikhailovich Prokudin-Gorskii between 1910-1915, inspired the filmmakers' approach to ghosts. Bottom: Norman's late grandmother exhibits the effect.

Top photo courtesy of the Library of Congress.

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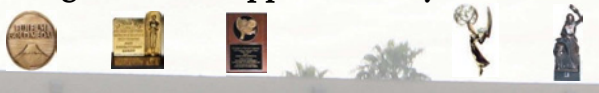
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Top: Alvin, the school bully, changes his tune when zombies rise from the local cemetery and threaten him and Norman. Bottom: Animation rigger David Pugh preps a scene in the Town Hall archives.



extensive stop-frame experience, and they all took direction. I made up mood reels, reference reels, and every member of the camera crew watched those to get an idea of the vibe of whatever sequence was starting up on the floor. Then, I'd sit with the lighting cameramen for a sequence and talk them through exactly what I wanted. I'd see every frame that came off the floor and give them notes appropriate to what they were doing. The problem with stop-frame is that it's easy to form these tight little teams, and they can end up making five different short films that you then have to bolt together into a feature. To avoid that, I do a lot of top-down supervision, and my crewing structure is quite loose. My camera assistants and my sparks move around the studio depending on where they're needed.

The rapid-prototyping machine Laika uses was able to print in color this time around, whereas it could only print in white for *Coraline*. How did that affect your lighting for the puppets?

Oliver: Because we could print in color, all the texture inherent in the prototyping process went into the face. That 'skin' texture was the first thing I tested. It's an epoxy resin that has granularity to it, like very fine sand. I was somewhat worried about how it would take light, but actually, it's rather lovely. Clay is very matte, and if you go up the lighter end of the spectrum, it very rapidly overexposes, whereas this material has a nice, eggshell-style sheen. It gives a lot of subsurface scatter and wraparound that's more like shooting human flesh.

The ghosts in the movie all have a vibrant, colorful aura. What was the inspiration for that effect?

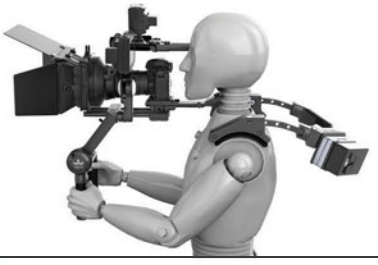
Oliver: A very early Russian color process, actually. We didn't want to do our ghosts as your classic transparent people. I'm very interested in early color photography, and I found these amazing photos by [Sergei Mikhailovich] Prokudin-Gorskii, who shot RGB black-and-white separation plates in quick succession and then projected them through filters to create color images. His subjects were often people, and they just about sat still long enough for the three plates, but in some shots they moved slightly, and that movement gave them this slight chromatic rainbow edge. Chris and Sam really liked that, so



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Hair-Raising Heroics



Right (clockwise from top): Lead motion-control operator Dean Holmes, camera assistant Kristina Schulte-Eversum, caster Chris Walker and head of armature Jeanne McIvor work on a sequence in which a zombie attacks a van carrying a search party looking for Norman. Behind the van is a policewoman giving chase on a motorcycle. Below: A frame showing the zombie's attack.



we used it for all the ghosts. The aura was CGI, but the look was driven by this 100-year-old process, and the puppet animation underneath was done by hand. Another one of Prokudin-Gorskii's photos ["Molding of an Artistic Casting," 1910] informed the look we gave the interior of Mr. Prenderghast's house, which is a kind of wrecked shack full of rubbish. We created incredibly hot windows using tungsten Fresnels, and they serve as the only source in this very dark environment.

Things get more theatrical when the zombies enter the picture. How did you approach those scenes?

Oliver: Yes, there are conventions you have to adhere to when you've got zombies [*laughs*]. The film essentially has two looks: there's the ultra-realistic everyday world, and then the zombies turn up and the camerawork gets rather obvious, with crash zooms, Dutching during zooms, and bounce stops. We wanted to get away from the green-and-red feel so many zombie movies have, so we used a combination of acid yellow and violet lighting on our zombies. For our night street scenes in town, we referenced these fantastic photorealistic paintings of New York streets at night. Every light source — shop windows, traffic lights, headlights — was a different color, and light was everywhere. We did our night exteriors like that and punched it up a bit by oversaturating the colors, and that enabled us to bring the zombies into town and keep colored light on them; it was perfectly motivated. Also, as you might expect, we reserved our more extreme use of stereo for the zombie scenes. We actually keep the stereo quite shallow through most of the movie.

How did you achieve the striking shot in the forest that takes the witch's POV as she flies in and attacks Norman?

Oliver: That's a fabulous shot that was always in the storyboard. We see Norman through the woods from a great distance, and he's tiny in the frame,

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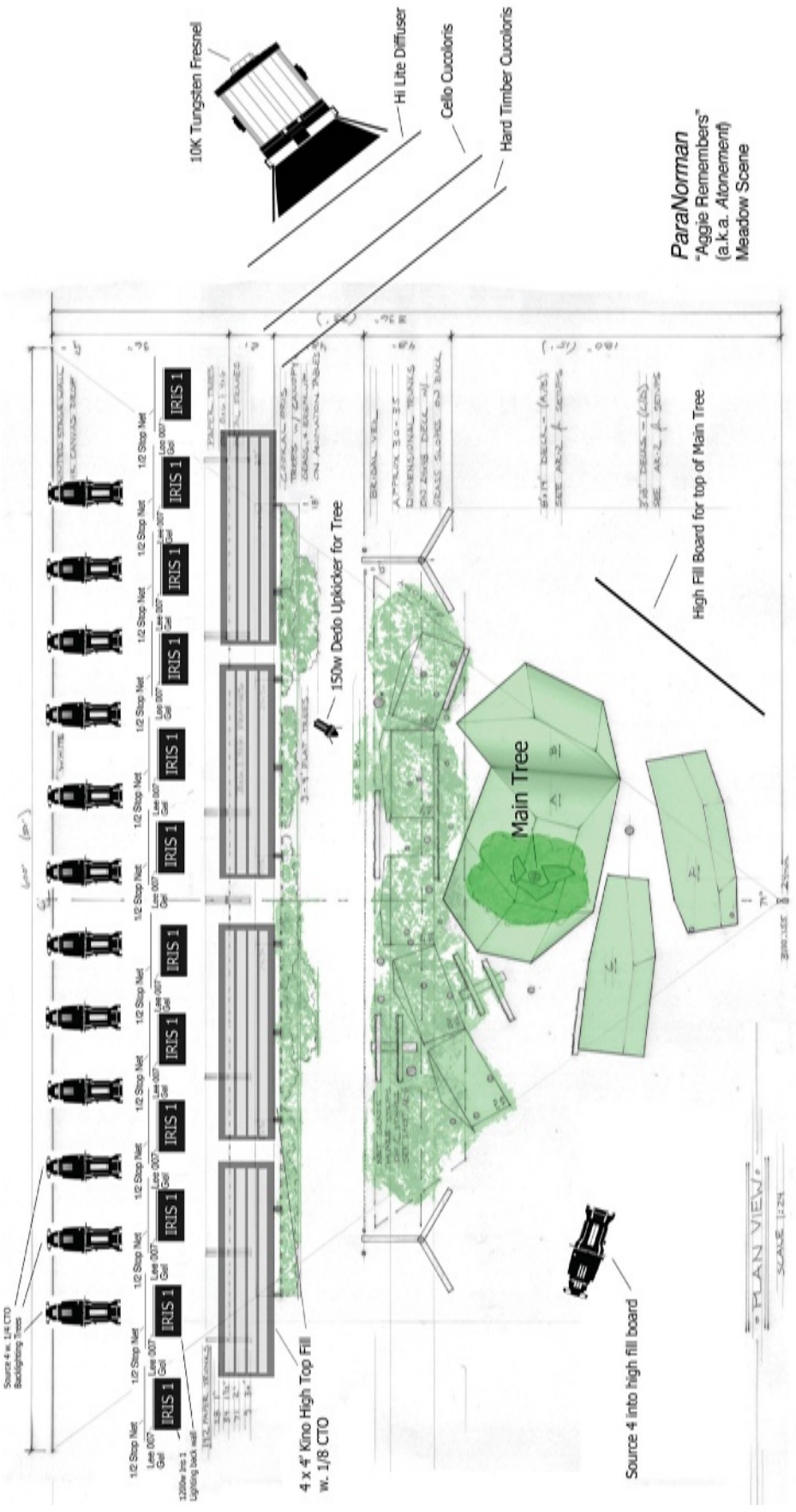
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and then the camera flies all the way in and ends on his ear, which fills the frame. We used an enormous, cruciform motion-control rig that had an arm with a 19-foot reach. I put the Cooke 5:1 [20-100mm] on the camera, and on either side of the lens, to represent the witch, I mounted a pair of 50-watt dichroic 12-volt lights that flickered via the Dragon DMX lighting control. We brought them up as she approached Norman, and his ear is almost nuclear by the time we land on it! We flew the rig in the whole of its 19 feet plus the entire range of the zoom in order to get the shot.

The witch looks like a tiny electrical storm, with trails of light coming off her hair and body. How was she created?

Oliver: She was a puppet, and all of her faces were printed, but the visual-effects team [led by Brian Van't Hul] enhanced her hair and wardrobe to produce those electrical trails, and we had to create interactive lighting on set for her scenes. Shortly after she flies into Norman's ear in the forest, she attacks him and splits into four to do a ring-around-the-rosy around him so he can't get away. To create that lighting effect on Norman, I built a steel frame about 2 feet high that had four arms and was slightly flared, like a Christmas tree. We put a string of 12-volt 10-watt tungsten bulbs, which we call 'grains of rice,' along each arm and placed the frame over Norman and on a rotator. As it rotated, we shot him from a low angle on a 28mm lens so we could get a clear field of view without [the rig] crossing his face. We also had to pull a matte off him, so the rig had to not only rotate, but also move up and down. It would come down, rotate as we were taking a frame; and then it would go up, the lighting would change to illuminate the greenscreen behind him, and we'd retake the frame; and then it would come down and be ready for the next frame. And, of course, it had to do that for left eye and then right eye! The problem with go motion in stereo is that you have to take each frame on the go twice, once for left



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Hair-Raising Heroics





Top: A key scene between Norman and a girl named Aggie is set in a peaceful meadow. Oliver's diagram of the lighting appears on page 72. Bottom: Oliver and production designer Nelson Lowry confer while filming the scene.

and once for right, and that's confounding to Kuper [motion-control] software. It was very tricky, and there was a lot of cursing and sweating.

How did you develop the look of Norman's flashbacks to the 18th century?

Oliver: Sometimes the reality of the world around Norman starts to give way, and he sees into another time through a sort of disintegrating veil. We took a strong line with most of the details in the film, but there were a few things, including these transitions to the past, that were always very sketchily conceived. We tested various effects, and one of the things we played with a lot was film getting stuck in a projector gate and burning away. We came up with something similar for the transitions, but it looks a little bubblier. It's an ember edge that crawls away into the corners of the image, and it's entirely CG. We also tested effects for the overall look of the flashbacks. The film has a very saturated palette, with lots of primary color, and we wanted Norman's visions to look different from that but not 'tricksy.' We eventually decided to do it as a grading effect with [Technicolor colorist] Tim Peeler. I played around with a lot of, in hindsight, rather unimaginative things [*laughs*], and we tried various LUTs, but they never looked right. Eventually, I suggested we try a bleach-bypass feel. No two people imagine that the same way, so that led to more experimenting. Finally, we arrived at what I think of as bleach bypass: we put a lot of black into the reds, we desaturated it, and we upped the contrast. I graded an entire

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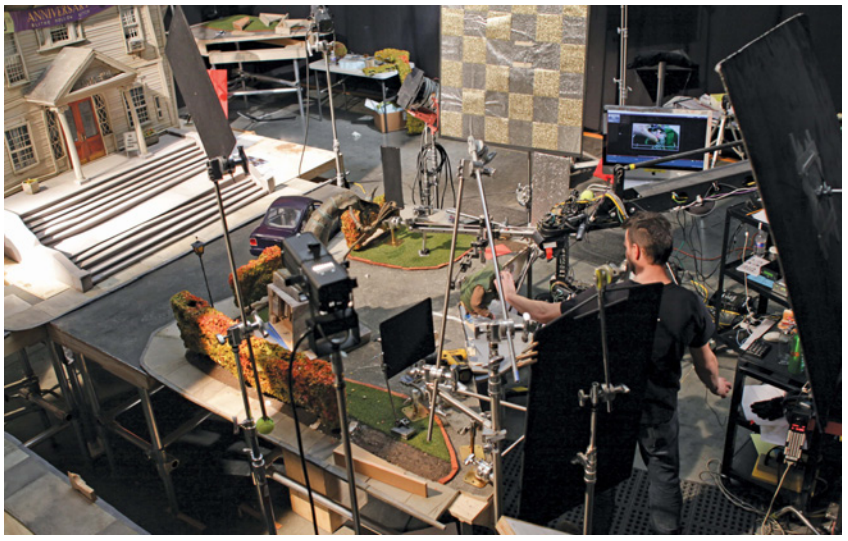
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Animator Gabe Sprenger creates some action for a scene involving Mr. Prenderghast, Norman's great uncle.

flashback that way and showed the directors, and they loved it, so we applied it to all the other flashbacks. It works really nicely because we go from a snappy, colorful palette into a different kind of palette, but the contrast stays the same. We've just given the look a different temperature, a different season.

The final flashback, which transports Norman and the witch to a meadow, feels different from everything else in the movie.

Oliver: I wanted it to be completely different, and it's the sequence I'm most pleased with because I managed to do it very simply: I used a big keylight and just feathered in the rest. [See diagram on page 72.] The film cuts from a present-day scene of extreme violence to this very tender moment set 300 years earlier, as this little girl materializes next to Norman in a sunny meadow surrounded by trees. The whole sequence has about 40 shots, and the nature of the storyboards called for a set of impossible size. The backdrop would've had to be 200 feet wide to accommodate the width of the shots we wanted to do! So, I had to work out a way of lighting so we could keep the camera pointed in the same direction, but it could serve for any direction, and I needed to be able to move the keylight around and keep track of where it had to be in order for the shadows to fall



correctly. The backdrop we built was 60-70 feet long, and it had no visible end; it's essentially a row of trees that fades away into an overexposed void. The art department built four rows of trees, and I overexposed everything that lay behind them to the point where it started to bleed and the rear-most layer of trees became rather phantom-like, with a nebulous, streaky quality. I shot clean, white light for the majority of it, adding a tiny amount of [Lee] 007 Pale Yellow in the far background. Using a map for the sun's position and a map of the children's trajectory, I just wheeled around our sun, a Mole-Richardson 10K, as they moved through the meadow. The scene has a very soft, rather magical feel to it. It works.

What's your assessment of your first experience with 3-D filmmaking?

Oliver: I'm now in the midst of the 3-D grade, and I find the limitations of the process quite depressing. We got the material into Technicolor and did the 2-D grade for DCP, and it was revelatory — we were finally seeing it at full [2K] resolution after screening dailies as 8-bit JPEGs for two years. Then we got the LUT for the filmout and saw a test print, and that looked great, too. But everything gets fantastically darker with 3-D because of the filter [in front of the projector], the glasses and the theaters' practice of dimming the projector bulb to the lowest level possible to prolong bulb life and cut costs. With 3-D, which is designed to project at 6 foot-lamberts, you're now grading for projection at 3½ foot-lamberts as opposed to 16 [for 35mm] or 14 [for 2-D DCP]. At 3½, the clipping in the highlights is a major problem. I'm very happy with how *ParaNorman* looks in 2-D, but achieving a similar picture in 3-D is virtually impossible.

I'm not convinced stereo lends much to a movie because if it's subtle, within 10 minutes you cease to register it, and if it's in your face, it makes you feel ill. With *Coraline*, I saw its potential to add size and dimension to stop-frame, where you're always sort of aware of a back wall. I thought stereo could take the eye a bit farther away and make you think you're in a fully dimensional world rather than a cartoon world, and I like to think that's how it works in *ParaNorman*. But I haven't yet seen a movie that benefited from 3-D as much as it benefited from a good script. ●

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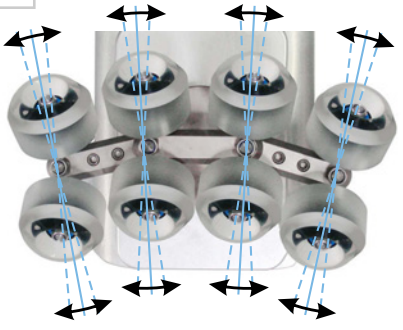
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Optimizing Digital-Camera Workflows

The ASC and the Producers Guild collaborate on the Image Control Assessment Series to seek industry-wide image-finishing standards.

By Jay Holben

•|•

The motion-picture industry is evolving at a lightning pace. Since the onset of the digital revolution at the start of the new millennium, scores of technological advances have significantly changed the way screen images are created and exhibited. These digital leaps have changed the shape and makeup of crews, the tools used to capture images, the technology involved in movie displays both in theaters and at home, and, most certainly, the workflows that take projects from postproduction to exhibition.

Working hard to stay at the forefront of these shifts are the ASC's Technology Committee and its various subcommittees. Chaired by Curtis Clark, ASC, the Technology Committee spends a great deal of time investigating advances in technology to keep the ASC ahead of the curve.

In the new frontier of digital, the game changes constantly. The combined forces of Sony and George Lucas introduced the industry's first 24p HD digital cinema camera, the Sony HDW-F900, in 2000. Since then, a remarkable evolution has taken place, with newer and better cameras arriving on the market every year. We've graduated from 1920x1080 to 4K and beyond. Sensor technology, compression technology and recording media have all improved by quantum leaps over the





Opposite and this page, top: Camera operator Terry Bowen (wearing orange hat) lines up a shot during production of the Image Control Assessment Series, which was organized by the ASC and the Producers Guild of America. This page, bottom: Robert Primes, ASC checks the frame with an Arri 435 Xtreme camera.

Photos by Michael Martin, courtesy of Revelations Entertainment.



Optimizing Digital-Camera Workflows



Frederic Goodich, ASC, who directed the night scene, walks his actors through their blocking.

past 12 years. In 2006, just over 12 percent of films released theatrically were originated digitally; in 2011, that number rose to 35 percent. While this means that 65 percent of last year's theatrically released movies were shot on film, the significant jump in digital origination shows no signs of slowing.

One industry fixture keeping close tabs on the trends is Lori McCreary, the CEO for Revelations Entertainment, the production company she co-founded with actor/producer Morgan Freeman. McCreary's credits as a producer include *10 Items or Less, The Contract, Invictus,* Freeman's documentary television series *Through the Wormhole,* and the upcoming *Rendezvous with Rama*. She also serves as treasurer of the Producers Guild of America and founded the PGA's Motion Picture Technology Committee, which was inspired by the ASC's example. As a former computer technologist with a computer-science degree from the University of California-Los Angeles, McCreary understands the importance of tracking new technologies. To that end, she has maintained a close relationship with Clark and frequently seeks his counsel on the advancement of camera technologies.

Some years ago, Clark invited McCreary to attend the monthly Technology Committee meetings at the ASC Clubhouse, and the producer found the experience to be a revelation. "The guys at the ASC were so technically proficient, more so than anyone else I had known," McCreary attests. "Cinematographers are the people who know what's going on in the tech side of the business, and things are changing and evolving very quickly. Things used to be easy: a camera was just a camera, and we knew how to budget for a camera. We'd bring a director and a production designer onto a production and then bring on a cinematographer to pick the film stock, the lenses and the lighting, but we could estimate what all of that would [cost] in a budget before they came on. Today, the game is very different. Every camera is a different tool with its own subtle attributes, and every camera requires a different kind of workflow. It's now impossible to even budget a film until we know what camera and workflow we're going to be using. How are we screening dailies? Are we setting 'the color' on set? How are we delivering to editorial? There are so many decisions that have to be made, and they all lead down different paths. It's very important to bring in a cinematographer during the extremely early

stages of a production to make these decisions. Making a decision about a camera before a cinematographer is involved takes the creativity and control out of their hands, and I'd never do that."

McCreary was instrumental in organizing the first ASC/PGA collaboration that led to the 2009 Camera Assessment Series (*AC* June and Sept. '09), an intensive analysis of various digital cinema cameras. The test included the Arri D-21, Panasonic's AJ-HPX3700, Panavision's Genesis, the Red One, Sony's F23 and F35, the Thomson Grass Valley Viper, and, as a point of reference, an Arri 435 capturing images with Kodak Vision2 250T 5217, Vision3 500T 5219, Vision2 250D 5205 and Vision3 250D 5207.

Much was learned from the tests, but much has changed since 2009, and this led Clark and Camera Technology Subcommittee Chairman David Stump, ASC to reteam with McCreary and arrange a second series of tests. This time, however, the testing wasn't focused primarily on the cameras, but on their workflows and how they performed within a rigorously defined, common color-management system.

"About a year after we did the first test, producers began begging for another assessment," McCreary recalls. "The cameras were changing so quickly. The images from all of them were quite spectacular, but from a producer's point of view, the biggest problem was the uncertainty about the workflows. What could we do to present an industry-wide guideline that would help eliminate some of this uncertainty? How could we get these beautiful images from the set all the way through distribution in the most streamlined way? And how could we control those images in the best, most efficient way possible?"

ASC associate Leon Silverman, former president of LaserPacific and current general manager of the Digital Studio at Walt Disney Studios, played an instrumental role in both assessment tests. While pondering these new and varied post paths, he dubbed them





Optimizing Digital-Camera Workflows



Camera operator David Knight frames the action for the night-exterior scene, which was set "in the rain with fire and point-source lights in neon and flashy colors," says David Stump, ASC, who served as supervising cinematographer alongside ASC President Stephen Lighthill. "We went out of our way to write scripts that would make each of the two shots feel much more cinematic while still stressing the cameras to the fullest extent in both day and night situations."



"snowflake workflows" — no two are ever alike. The urgent need to eliminate these vicissitudes led the organizers of the second assessment series to focus on image control, a priority reflected in the name of the new test: the Image Control Assessment Series.

The intent was not to compare the imaging qualities of the cameras, but to find a single, standardized color-management architecture that would work with any new camera system, preserve the integrity of the image throughout the entire post workflow, and eliminate the need to "reinvent the wheel" with each new camera system, on each new production and at each post facility.

ASC President Stephen Lighthill notes, "The Camera Assessment Series was an assessment of camera technology at the time of the test, and secondarily an observation of the workflow challenges each camera presented. The Image Control Assessment Series was primarily a test of workflow and secondarily an observation — not a test — of the performance of the most commonly used large-sensor cameras during the production of scenes that might be typical of TV or feature narratives."

In the Camera Assessment Series, the ASC and PGA applied the most standardized workflow available at the time, which involved scanning and transforming all of the footage from each camera to a 2K 10-bit Cineon DPX workflow. Some criticized this decision, maintaining that it severely handcuffed the film stocks (by scanning at 4K and converting to 2K rather than maintaining 4K resolution) and the

digital formats (because of the color-space limitations of the 10-bit Cineon files). The Cineon files were created to emulate the color space of print film, but they simply could not handle the larger gamut ranges of modern film stocks and many of the new digital cameras.

"Basically, the Camera Assessment Series taught us that Cineon DPX was quickly becoming obsolete," says Stump. "When we did those tests, it was — and still mostly is — the de facto workflow for finishing, but the scope of Cineon DPX is now far too limiting, and we knew we needed to find something much better." In pursuit of that goal, Stump and Lighthill served as "über DPs" on the ICAS tests, supervising the individual cinematographers assigned to each camera during the shoot.

Clark observes, "We knew we needed to change the post workflow to accommodate an expanded color gamut and wider dynamic range for any further assessments we did beyond the CAS. The Academy Color Encoding System, known as ACES, had matured since our 2009 test, and we, as a group, became much more aware of what it is and what it is doing. We therefore decided that it would be the foundation for the Image Control Assessment Series so we could use the expanded color gamut of ACES color space. We knew ACES would be able to accommodate the wider dynamic range and greater color bit depth of the newer digital cinema cameras, and that it would also better utilize film's full potential and protect its attributes. We also changed from a 2K pipeline to a 4K pipeline to bring it up to the current parameters of high-end digital cinema."

ACES utilizes a 16-bit floating-point OpenEXR file container with an extraordinarily wide color gamut whose range easily encompasses all existing color spaces. To utilize the ACES container, footage from each camera would be processed through an Input Device Transform generally created by (or in close cooperation with) each camera's specific manufacturer. These IDTs served to translate each camera's





Optimizing Digital-Camera Workflows





Right: The PGA's Hawk Koch worked with Lori McCreary, the CEO of Revelations Entertainment, as the ICAS supervisors. Below: Stump on location with co-producer/post supervisor Cory McCrum.

native color space into the 16-bit floating-point color space of the ACES OpenEXR format.

The cameras used in the ICAS test were the Arri Alexa, Canon's C300, the Red Epic, and Sony's F3 and F65, along with an Arri 435 Xtreme shooting Kodak Vision3 250D 5207 (for the day scene) and 500T 5219 (for the night scene).

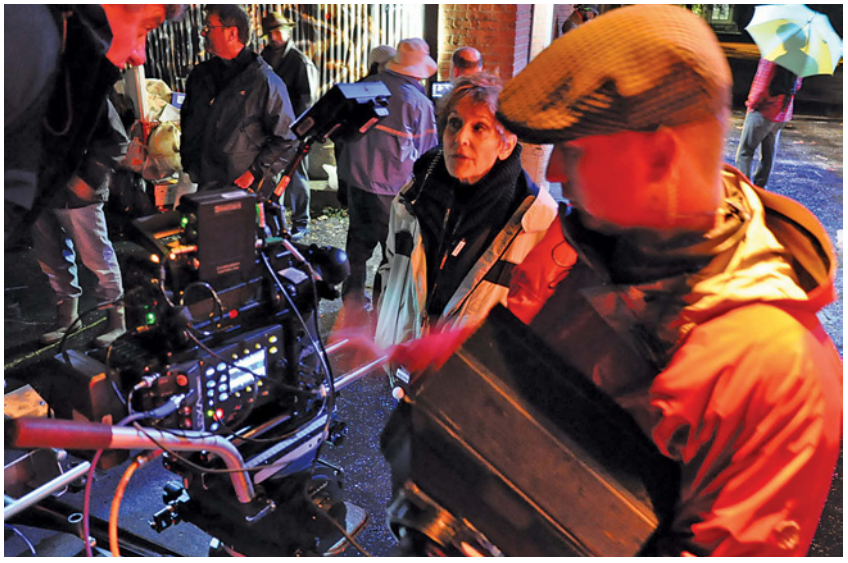
All of the footage captured by the cameras was recorded with the full range of recording options: the Arri Alexa recorded to both internal SxS cards in the ProRes 4:4:4 format and an onboard Codex recorder in ArriRaw; the Canon C300 recorded Rec709 HD to internal Compact Flash cards, as well as Canon raw log to an external recorder; the Red Epic recorded 16-bit raw Redcode R3D files to SSD cards; Sony's F3 recorded Rec709 HD to SxS cards and uncompressed HD via dual-link HD-SDI; and the Sony F65 recorded to an HDCam-SR deck and also to its internal 1-Terabyte solid-state memory cards in 16-bit raw. Depending on the manufacturers' decisions, the highest-quality image from each camera was selected and processed through the individual IDTs to bring the footage into the ACES container. (Before being sent through the IDTs, footage from the Canon C300 and Sony F3 was uprezzed to 4K through Nuke. EFilm scanned the film footage at 6K and then resized it to 4K for the assessment.)

"It's not a one-size-fits-all world anymore," says Stump. "You can mix and match cameras, and each production has the right to expect that they can all be plugged into one timeline for post. Until every post facility can do that — and provide meaningful digital archiving — we are still facing a significant deficit in the post world. It is our hope that ACES is the solution to that deficit."

Another criticism of the Camera Assessment Series was that the scenes the cinematographers blocked out and shot were too much like camera tests rather than real scenes with cinematic qualities. For the ICAS test, the cinematographers prepared only two narrative scenes, both of which told stories that could have been lifted straight out of an actual film. The scenes were shot on the lot at Warner Bros.

The first sequence, titled "Serious News," was a daylight scene set in a 1940s diner. Large windows provided views of a bright, harsh, sunlit exterior, and the interior was lit mainly with the resulting ambient light. The story follows a young paperboy. A long tracking shot starts on the street outside the diner and leads the boy into the diner, where he hawks his wares to the patrons. One of the buyers is a mysterious man sitting in a dimly lit corner; he reads a headline about an arson and hastily exits the diner. Completed in one smooth camera move, the sequence contrasts the exterior's hot, bright skies with the interior's deep shadows.

The second scene was a Fellini-esque night exterior. A young woman dressed in theatrical clothing dances her way through a rainy alley and past a couple of homeless men near a barrel fire. She offers her coat to a shivering young mother sitting on the curb near a storefront window, and then joins a hodgepodge of city dwellers for an exuberant dance on the rainy street. The sequence encompasses the intense high contrast between deep shadows, bright flames, low light on faces, bright lights in the windows of buildings adorned with neon signs and hot streetlamps. The wet streets pick up specular highlights, and the eccentric characters wear colorful costumes that push the color



Nancy Schreiber, ASC (center) confers with Knight as key 1st AC E. Gunnar Mortensen readies the Arri Alexa for the night shoot.

gamut of each camera close to its limit.

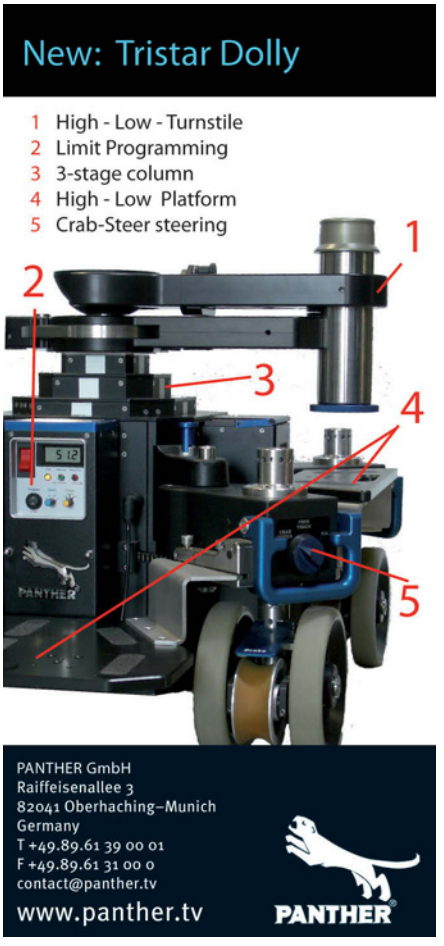
"We wanted to generate material that didn't just feel like another camera test," says Stump. "We went out of our way to write scripts that would make each of the two shots feel much more cinematic while still stressing the cameras to the fullest extent in both day and night situations: a day interior with bright, sunny, hazy, almost-white skies beyond the windows, and a night exterior in the rain with fire, point-source lights in neon, and flashy colors."

Supervising cinematographers Stump and Lighthill were supported on set by cinematographers Robert Primes, ASC; Nancy Schreiber, ASC; and Steve Mason, ASC. Bruce Logan, ASC and Frederic Goodich, ASC served as directors of the day interior and the night exterior scenes, respectively. (Marty Ollstein served as the on-set data documentarian, and Marco Bario of Creative Science supervised dailies.) Cameras were operated by Terry Bowen and David Knight, and E. Gunnar Mortensen served as the key first AC for the shoot.

In addition, a camera supervisor was assigned to the various cameras to ensure that the best care was taken with each unique system: Ron Rashke for the Arri 435; Kees Van Oostrum, ASC for the Arri Alexa; Hiro Fukuda for the Red Epic; Jamie Metzger for Sony's F65; Tammy Fouts for Sony's F3; and Dana Christiaansen for the Canon C300. (Each manufacturer also had its own personnel on hand.) ASC member Ron Garcia and PGA member Lisa Sontolongo served as supervising producers for the "behind-the-scenes" camera sequences; McCreary and Hawk Koch were the overall producer and director, respectively, for the entire series, with Cory McCrum, Fiona Walsh and John Kaiser acting as co-producers. (McCrum also served as post supervisor.)

Although it represents a significant step toward a unified, transparent color-management workflow architecture for all digital motion-picture imagery, ACES is still evolving and has not yet been perfected for every camera system. Creating and employing the appropriate IDTs requires close partnership between the Academy and the individual camera manufacturers. It is also important to understand that ACES is intended to be a solution for narrative cinema and television productions; it does not apply to news, sports or live television. ➢





Optimizing Digital-Camera Workflows



Knight operates during the night shoot with actress Melissa Center.

"ACES gives us transparency, reliability, predictability and protection of the original image capture and eliminates the uncertainty of the 'special sauce' that some facilities have to create in order to deal with footage," says Clark. "We need one standardized color-management workflow architecture that can work with any and all camera systems so that images from those cameras can be easily exported from one facility to another while maintaining image fidelity. ACES, which has recently become a SMPTE standard, is that framework. The ASC Technology Committee, working in close collaboration with the Academy, has been extremely active in advancing ACES, and now there's definitely a rapidly growing light at the end of the tunnel."

Lighthill feels the industry "is very close to a standardized color-management software that will work with all cameras and all facilities. If you



have a project that involves just one camera with one codec, and you do not have to integrate files from different cameras, then I suppose you could work without ACES. However, most projects do involve various cameras and file formats, and ACES is designed to handle this variety.

"The community of producers, cinematographers, technicians and facilities made a monumental effort to design, implement and test ACES," Lighthill continues. "As the production world is pushed and pulled by various technologies, this community will face more challenges and should be prepared to act together to achieve our common goals."

"I was impressed to see how far ACES has come," offers McCreary. "The images that came out of the ICAS were so much better and took so much less time than [those that came out of] the CAS in 2009, when we were working with 10-bit DPX files. I was quite excited to get through dailies, which we referred to as our 'work print,' very quickly. If you've got a multiple-camera shoot — especially multiple different cameras — this is a great way to go.

"I'm very pleased that the Academy has been working for eight years toward something that is really for the industry as a whole," she continues. "Very few entities in our industry really work for the benefit of the whole, but the Academy and the ASC have been working for many years to establish this new standard that will improve the lives of all of us in the business. Without that commitment, our industry would be a lot further behind the technological curve. Standards are what allow us more room for creative freedom instead of having to reinvent the proverbial wheel with every production.

"[The members of] the ASC are the unsung heroes helping move this industry forward," McCreary concludes. "I know the PGA is eternally grateful for their efforts in helping to improve our business both technically and creatively."

Screenings of the ICAS are slated for IBC in Amsterdam and at all of the major studios in Hollywood. The ACES SMPTE Standard (SMPTE ST 2065-1:2012) has been published.

The ASC and PGA note that the ICAS could not have been completed without the generous cooperation of IATSE, SAG, DGA and the Teamsters; the individual camera manufacturers, along with supporting production and post facilities; and hundreds of crewmembers who volunteered their time. ●

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A woman (Katherine Randolph) navigates a Cadillac Eldorado through a metaphysical landscape in the short film *Eldorado*, which Curtis Clark, ASC directed and shot using Sony's F65 CineAlta camera.

ACES Enables *Eldorado*'s F65 Workflow

By David Heuring

As chairman of the ASC Technology Committee, Curtis Clark, ASC has sought to influence the evolution of digital motion-imaging technologies with the goal of providing cinematographers with the most powerful and flexible tools. At the same time, he works to ensure that changes in technology don't erode the cinematographer's prerogatives as custodians of the image. Clark's latest endeavor toward those ends is *Eldorado*, a 10-minute motion picture that was captured in 16-bit raw image files, posted in 4K and finished as a DCP file for 4K projection.

Clark directed and photographed *Eldorado* with the first production model of Sony's F65 CineAlta camera. According to Sony specs, the F65 uses an 8K 20-megapixel CMOS imaging sensor (with 18.7 megapixels in its active area) to produce a 4K 4096x2160 image-file output. The sensor is equivalent in size to a Super 35mm film frame (24.7mm x 13.1mm), allowing the use of 35mm-format lenses. It uses a Sony-designed color filter array that passes along 100 percent of the green information, 50 percent of the red and 50 percent of the blue; as a result, there is less interpolation than in other cameras in order to reach 16-bit 4:4:4 RGB and retain an unambiguous 4K spatial resolution.

The camera incorporates a number of improvements over the prototype Clark used to shoot *The Arrival* (*AC* Aug. '11). The most important upgrade for Clark was the ability of the camera to output 16-bit linear raw files directly to SRMemory cards using an onboard SR-R4 Memory Recorder. The new production model also features software upgrades, enhanced frame-rate options and a mechanical shutter that eliminates rolling-shutter artifacts.

"The purpose of *Eldorado* wasn't just to demonstrate the ability of the camera to create wide-dynamic-range images with great color bit depth and high resolution," Clark says, "but to do so in an engaging narrative context that illustrates how those attributes can more effectively tell a story."

Eldorado depicts a woman (Katherine Randolph) surrounded by the glossy commercial landscape of Las Vegas. She drives an immaculate 1957 Cadillac Eldorado convertible, and the hypnotic lights of Vegas seductively promise a certain kind of earthly escape. Time-lapse cinematography transitions dawn to daylight, and the woman is then seen driving through the otherworldly natural rock formations in Nevada's Valley of Fire. The painterly vistas stand in stark contrast to the artificial world she has left behind, and they seem to represent a more genuine and deep spirituality. Eventually, the woman sees a rock formation that transforms into a face that she first saw on a playing card back in a Las Vegas casino.

Photos by Carin Baer. Photos and frame grabs courtesy of Sony Corp. and Sony Pictures Colorworks. Workflow diagram courtesy of Curtis Clark.

"These two environments are meant to play out as mental landscapes as much as actual physical places," notes Clark. "The selection of an environment, a context for a narrative, can be as crucial as anything on the written page. It's actually a kind of writing with images. The film juxtaposes that external world with the 'interior world' of the character. It engages the viewer poetically by going beyond the literal, viewed as a piece of reality being documented.

"*Eldorado* required a very effective, dramatic depiction of landscape vistas — not just postcard scenes, but something intrinsic to narrative and character," he continues. "I knew the F65 had the expanded color bit depth and enhanced resolution to capture all the nuances in color and the textural details in the wide vistas. When images have that amazing textural detail and tonal subtlety, they can be held longer, because they engage the audience on an emotional level you just can't achieve with a lesser camera or a workflow that is incapable of preserving it. To me, that's the definition of 'cinematic.'"

Clark took the F65 on several scouting journeys and captured images that were then used by dailies colorist Ed Twiford at Colorworks to develop a look reference. These parameters were later applied to the 16-bit raw files in the Colorworks DI suite.

Throughout the four-day shoot, Clark generally worked with exposure indices at or near 800 ASA. He kept the shutter at 180 degrees and shot at 24p because "the traditional film frame rate and its attendant motion blur is still part of our film culture, and because faster frame rates can look like high-resolution video." He used no filtration aside from the camera's internal NDs and a polarizer on the exterior scenes.

For Ultimate Arm shots tracking the car, Clark fitted the F65 with the Fujinon Premier 18-85mm T2 zoom lens, which he used as a variable prime. For day-exterior situations using Steadicam, and for scenes shot in the casino, he used the Leica Summilux-C primes. He says that the zoom and the primes intercut "beautifully."

Clark elected to use the camera without on-set or near-set look management, just as he might use a film camera; he didn't want to spend time assessing and

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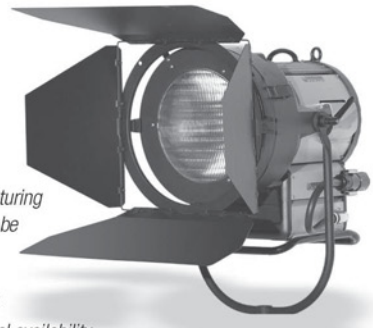
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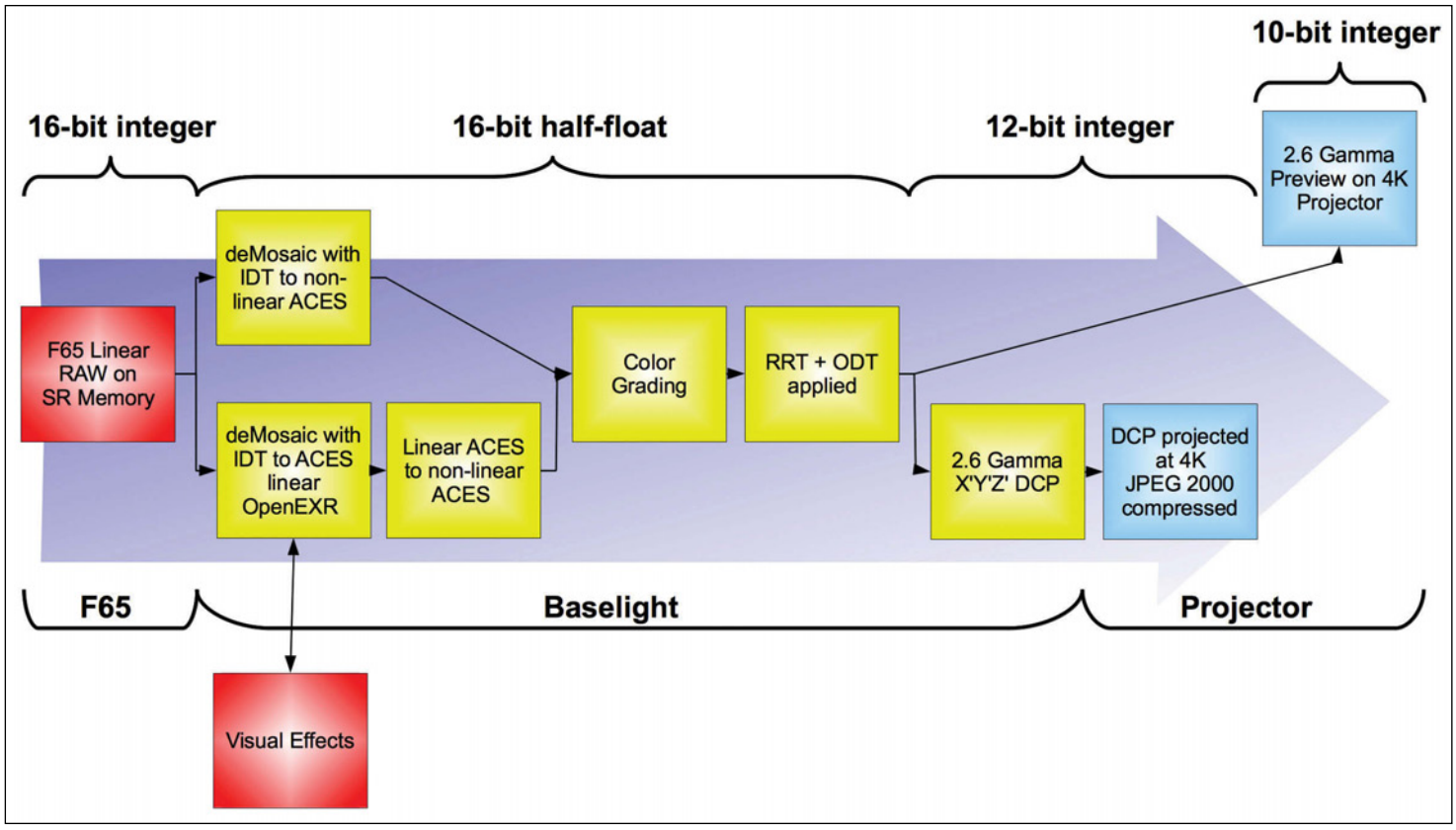
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Above: This diagram shows the path of the F65-acquired images through the ACES architecture and out to a 4K DCP. Left: Clark works with Randolph on location inside a Las Vegas casino.

analyzing images during the shoot. "Running back and forth between the set and the DIT tent, obsessing about every shot — it's stressful and it can distract you from what you should be focusing on," he says. "The workflow should serve the creative process, not interfere with it." Reliable data management was more of a concern, with multiple backup procedures designed and implemented, using both portable hard drives and LTO 5 tape.

The F65's 4K workflow and compatibility with the Academy Color Encoding System significantly streamlined *Eldorado*'s post process. ACES is an image and color management architecture that comprises a set of encoding specifications, transforms and recommended practices designed to enable the creation and processing of images that use a greater dynamic range of scene tones and a wider color gamut, utilizing greater bit depth. ACES includes high-precision 16-bit floating-point encoding; the F65's 16-bit raw image output dovetails with the ACES architecture.

The looks Clark had set up with Twiford meant he didn't need to be present for the dailies grade. "It's analogous to working with a timer in the lab," says Clark. "Ed knew what I was trying to achieve. We had images that captured all the necessary image information, the bit depth and spatial resolution, with 14 stops of dynamic range. I confidently shot with the F65 as I would have with film negative. Ed applied the color grade to the DNX-175 dailies that I used for editorial, and the color grade he did was amazingly spot-on. It was so close that when I went into the final color grading, working with the full 4K open EXR 16-bit files, we did remark-

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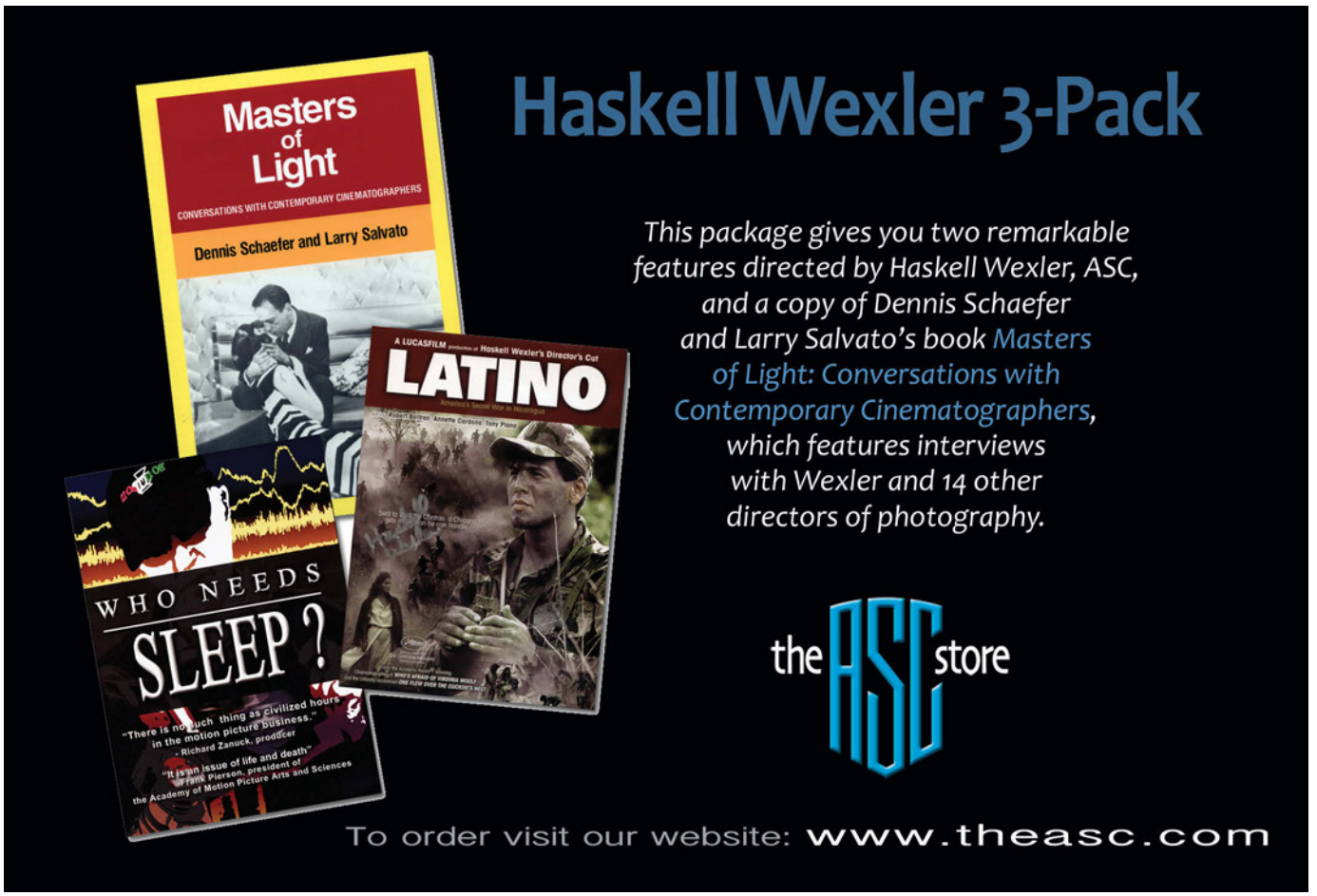
The production employed an Ultimate Arm to track with the car on location in Nevada's Valley of Fire.

ably little massaging or finessing. The starting point, by being in ACES, put me where I wanted to be."

At Colorworks, DI colorist Steve Bowen incorporated the metadata from the dailies grade while working directly with the original 4K 16-bit raw files for the final grade, which was done with a FilmLight Baselight system working in an ACES environment. "The ability to work in 16-bit allowed us to retain the integrity of the images and take full advantage of it in the final color grading," says Clark. "It was essential to delivering the experience I wanted to provide for the audience, with all the immersive quality and poetic image associations.

"One of the great things about ACES is that it includes an idealized form of print-film emulation in the reference-rendering transform," Clark continues. "The output of the F65 camera is in S-gamut color space, which is a fairly wide color space; in effect, it's wider than film, but it has a very filmic feeling. If you integrate that with an ACES workflow, where you've got that print-film emulation, you can preserve the full range of those colors and tones and maintain a more filmic feel. So you can have high resolution without a video look.

"Some people confuse sharpening with resolution," he says. "Video uses super-sharpening to give you that video 'presence,' but the best film has sufficient resolution. With true 4K resolution, you can



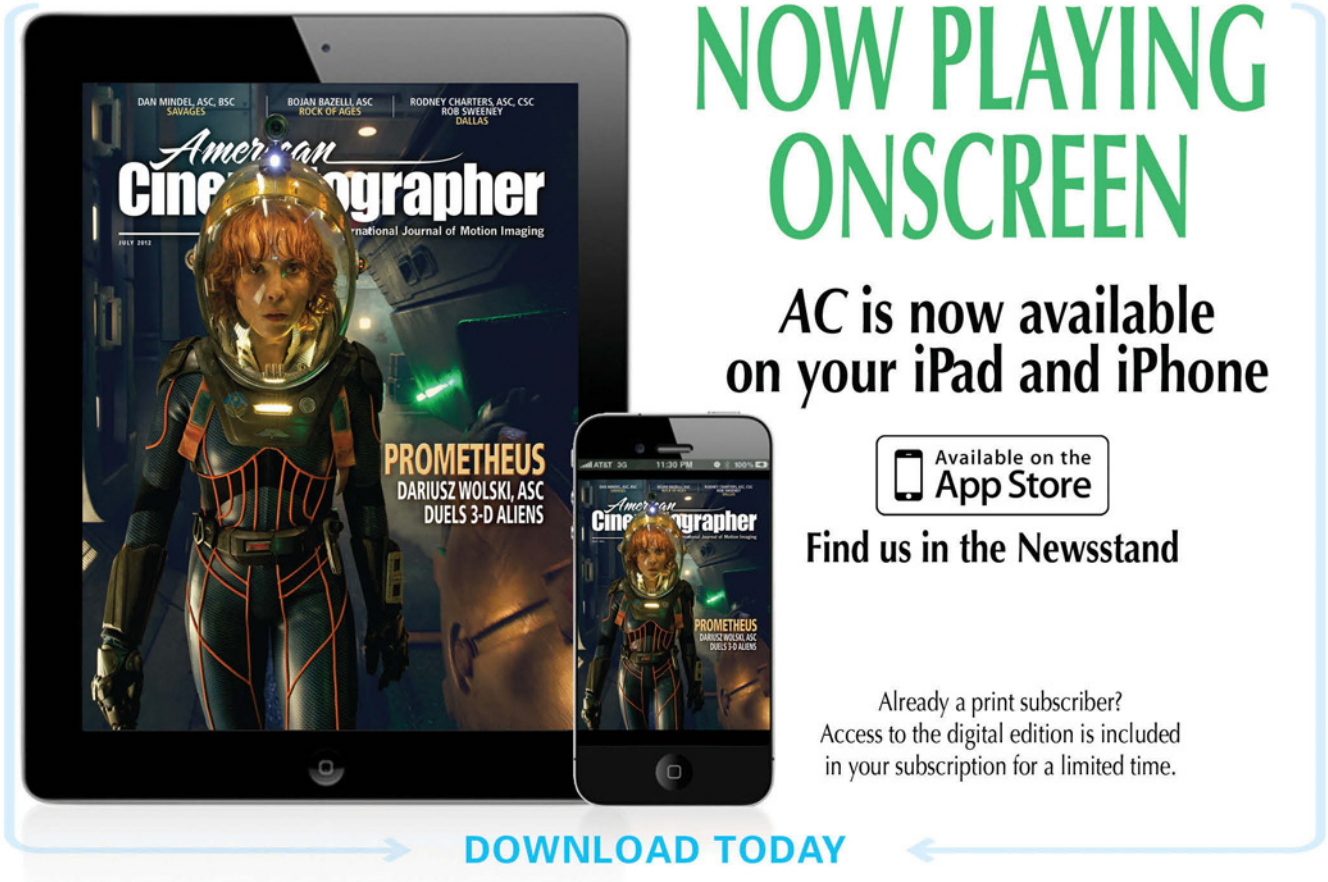
have normal sharpness without having to add extra artificial electronic sharpening to enhance the image. I think that's a quality that distinguishes the F65: It can take advantage of the super resolution and still distance itself from the video lineage."

The final step in *Eldorado*'s post workflow was the creation of a DCP file for 4K projection. "What we can learn from the experience of making *Eldorado* builds on the capabilities of the F65 camera," says Clark. "There are lessons about how the combined technology of the camera and the 4K workflow can retain the attributes of the highest quality motion-picture imaging, [with] a filmic look and feel.

"It's also important to realize that the technology has challenged our ability to adapt, to incorporate it into our creative processes and working methods comfortably and effectively," he adds. "It's actually running the risk of getting in our way, and in our attempts to compensate, we tend to obsess over technologies in an unhealthy way. Technologies can be disruptive by their nature. It's our responsibility to establish protocols and procedures that ensure that these technologies serve the creative process and reinforce rather than undermine the primary creative role of the cinematographer. It's a complex issue, and it requires discussion and consensus-building. It's all about how we adapt." ●



Clark blocks the camera and actor against the desert's rock formations. "*Eldorado* required a very effective, dramatic depiction of landscape vistas," he says.



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Fraunhofer Announces Digital Cinema Developments

The Fraunhofer Digital Cinema Alliance, which has recently been working with high-frame-rate 3-D technology, has launched the A/V Analyzing Toolbox and STAN Stereo Analyzer.

The German research organization comprises Fraunhofer IIS (Institute for Integrated Circuits), Fraunhofer First (Institute for Computer Architecture and Software Technology), Fraunhofer HHI (Institute for Telecommunications, Heinrich-Hertz-Institute) and Fraunhofer IDMT (Institute for Digital Media Technology). It offers R&D in the areas of production (camera and storage), 3-D technologies, audio systems, data compression, post processing, transmission, projection, distribution and digital archiving.

The Department of Moving Picture Technologies at Fraunhofer IIS has begun testing its high-frame-rate technologies in stereoscopic 3-D workflows. Together with Arri and Stereotec, Fraunhofer IIS shot short test clips at 120 fps per eye to simulate content at various frame rates and to create DCPs that play back at 24 fps, 30 fps and 60 fps per eye based on the same footage. (The test was conducted with two Arri Alexas and a midsize rig from Stereotec.) The technique mitigates or eliminates the motion blur and stuttering associated with 24-fps-per-eye capture and playback of 3-D footage.

Fraunhofer IDMT has launched Error Detection within its AV Analyzing Toolbox. The new feature enables users to detect errors and quality problems in A/V content before, during and after the production process. Additionally, Error Detection allows digital-film archives to ensure that only error-free material is ingested. It can also be used for controlling and monitoring broadcasting networks and A/V services such as digital archives or encoding/transcoding services. Error Detection monitors for such video errors as frozen images, black screens, under- and overexposure, blurring, blocking, and ringing, and for several different audio errors.

Fraunhofer HHI has partnered with Silicon Imaging to integrate Fraunhofer's STAN Stereo Analysis engine into Silicon Imaging's SI-3D Stereo Monitoring, Analysis, Recording and Transmission system. The SI-3D SMART system captures content from raw and HD-SDI sources and utilizes STAN to generate real-time camera geometry measurements and depth information for use in precision rig alignment and corrected 3-D output. This integration provides stereo visualization, color management, virtual parallax, FIZICS (focus, iris, zoom, interaxial and convergence) controls and recording in a single portable platform, all under wireless control via an Apple iPad. The synchronized recordings of imagery, audio, motion, correction and time code can be used for direct 2K/HD editing and finishing or linked with 4K source material.

For additional information, visit www.dcinema.fraunhofer.de.



Hot Rod Cameras Expands

Hot Rod Cameras has expanded operations and moved into a new facility in Hollywood. The new facility features a showroom that offers demonstrations of accessories from such respected brands as Arri, Cartoni, Chrosziel, Element Technica, OConnor and Zacuto.

Since introducing its professional solutions for mounting cinema lenses on HDSLR cameras, HRC has grown to become a value-added reseller and a distributor for select equipment manufacturers. As a factory-authorized dealer for Angenieux, Cooke, Fujinon, Schneider Optics and Zeiss, HRC also offers the "HRC Lens Bar" in the new Hollywood facility, where clients can enjoy interactive demonstrations and build and preview various configurations of dozens of in-house lenses, filters, and other specialty optics and optical accessories — all without having to leave their seats.

HRC's expansion allows the company to take on additional product lines and services, including the Blackmagic Design Cinema Camera, the Axis 1 wireless focus system, handcrafted front boxes, and the Paralinx Arrow uncompressed wireless HD system.

The company's services include comprehensive DSLR (all brands) body and lens repair, PL mount/flange adjustments and calibrations, custom engineering, modifications to hardware and

firmware, custom grip replacements, custom cases, anodizing, and color matching. It also offers evening, weekend and odd-hour shopping, pickup and delivery for clients working on productions.

Hot Rod Cameras, 1413 Cole Pl., Los Angeles. For more information, visit www.hotrodcameras.com.

Congo Films Services Latin America

Congo Films S.A. has announced the addition of the Russian Arm Mark IV to its rental inventory for the Latin American film market. Founded in 1983, Congo Films is a full-service rental facility offering camera, lighting and grip equipment, with offices in Bogota, Colombia, and Santiago, Chile.

The Russian Arm Mark IV joins such products as Milo and Tyler helicopter and stabilized mounts; Fisher, Panther, Moviegrip and Egripment cranes and dollies; Hawk, Cooke, Zeiss, Angenieux and Fujinon lenses; Arri Alexa Studio and Alexa Plus 4:3 cameras; Phantom Flex and Gold cameras; Codex recorders; Luminys, Arri, Mole Richardson, Kino Flo, K 5600 and Dedolight lighting fixtures; and a long list of rigging gear.

Filmmakers in Argentina, Brazil, Uruguay, Peru, Venezuela, Ecuador, Panama and Costa Rica often sublet specialized gear from Congo Films. At press time, the company is servicing Alejandro Jodorowsky's *La Danza de la Realidad*, shot by Jean-Marie Dreujou.

For additional information, visit www.congofilms.tv.

Encore Adds Vancouver Facility

Expanding on a network of post houses that includes facilities in Los Angeles and New York, Encore, a Deluxe Entertainment Services Group company, has announced a new facility in Vancouver, British Columbia.

All of Encore's facilities employ a common network that allows them to share media seamlessly, maximizing efficiency and capacity.

The company is also expanding its visual-effects services for TV to Vancouver. The Vancouver visual-effects division will be supervised by Ivan Hayden, who brings more than 15 years of experience to the role.





Hayden will report to Tom Kendall, vice president of visual effects for television at Deluxe.

Encore's Vancouver facility is conveniently located in the same complex that houses Deluxe's post facility and its visual-effects subsidiary Method Studios.

For additional information, visit www.bydeluxe.com.

Technicolor Vancouver Moves to Bridge Studios

Technicolor Vancouver is moving its primary facility to the Bridge Studios, with additional digital-dailies labs at the North Shore Studios and the Vancouver Film Studios.

Technicolor Vancouver now offers on-location services with a mobile Global Dailies solution at three of the major production studios in the city. The Global Dailies solution is compatible with Technicolor's DP Lights and is focused on making dailies a smooth process regardless of the camera type or native file.

Supporting workflow development and dailies management, Technicolor Vancouver offerings include project supervisors; 24-hour technical support; color correction with experienced long-form dailies colorists; extensive data storage; a private, secure, high-speed data network; and calibrated screening rooms for both broadcast and feature 2-D and 3-D productions.

Technicolor also offers remote on-set and mobile near-set solutions for productions shooting on location. These systems range from data wrangling to full color management.

For additional information, visit www.technicolor.com.

FilmLight Manages Color Pipeline

FilmLight has introduced a number of solutions that combine to make a seamless, end-to-end color-management and manipulation pipeline.

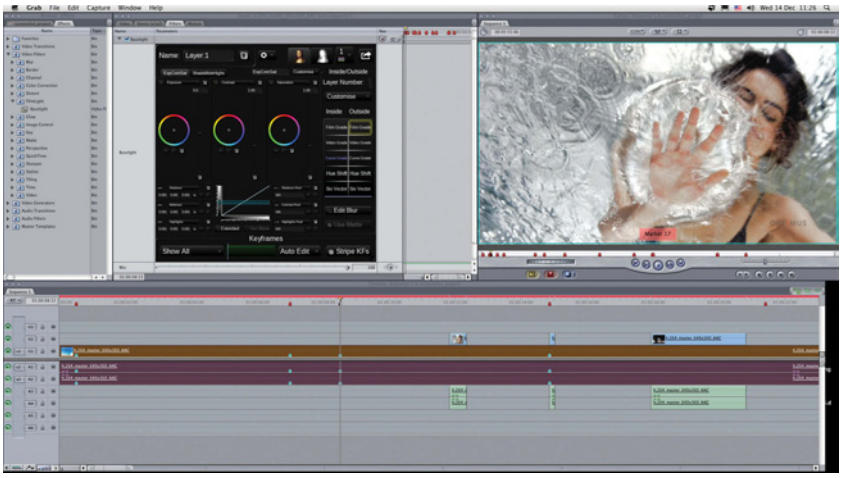
Flip is a real-time image-processing product that lets the creative production team design looks in prep and apply and refine them on set. Employing a Baselight GPU renderer with Truelight Color Management, Flip can create and store an unlimited number of preset looks and spatial filters, which can then be applied and refined in real time on set; that grade can then be saved and applied to dailies and other downstream processes.

At the next stage of the process, FilmLight has unveiled the Baselight Transfer near-set dailies solution, a fully featured real-time 4K dailies processing system that supports all of the latest digital cinema cameras. The production-proven solution has recently been put through its paces in an F65 4K ACES workflow for M. Night Shyamalan's *After Earth*, shot by Peter Suschitzky, ASC. Baselight Transfer also offers automatic color matching between on-set grading data from Flip and raw camera footage, ensuring absolute integrity with the look captured on set.



FilmLight also offers Baselight Editions, which make the color-grading toolset directly available to editors and visual-effects artists, providing tight integration between grading, editorial and visual effects. Baselight for Apple Final Cut Pro 7 already made this possible, and now FilmLight offers Baselight for The Foundry's Nuke, with Baselight for Avid Media Composer on the horizon.

Baselight 4.3, the latest version of FilmLight's grading software, marks a significant advance in terms of responsiveness and productivity. The software facilitates real-time, multi-layered color grading in 4K and beyond, as well as seamless exchange of timeline grading data with Baselight Editions.



Goldcrest Post, Narduzzo Too Embrace LightSpace

London-based Goldcrest Post has teamed with Narduzzo Too, a grading facility owned by Vince Narduzzo, after high demand at Narduzzo Too's Pinewood facility prompted the need for expanded services.

As part of the expansion, Goldcrest Post has adopted Light Illusion's LightSpace CMS color-management system to guarantee facility-wide color calibration, matching the color-management workflow already in place at the company's New York facility and at Narduzzo Too. In addition to purchasing LightSpace CMS with an X-Rite i1 Display 2 OEM probe, Goldcrest Post asked Light Illusion to consult on defining the new DI operation's workflow, suggesting associated display and monitoring systems, and overseeing the initial calibration of the room.

LightSpace CMS is one of a range of calibration systems developed by Light Illusion for use within the digital-imaging environment. Other color-management solutions include MatchLight IMS, SpaceMan ICC, LightDensity XYZ and Alexicc.

For additional information, visit www.goldcrestpost.co.uk, www.narduzzo too.com and www.lightillusion.com.

Finally, the company has previewed Flux, an open, scalable data-management platform. Specifically designed for the requirements of the postproduction industry, Flux offers data wrangling for complex productions with 100:1 shooting ratios and thousands of visual-effects shots.

For additional information, visit www.filmlight.ltd.uk.

Digital Vision Enhances Nucoda

Digital Vision has unveiled significant enhancements to its Nucoda color-grading platform, providing increased workflow capabilities and additional tools for grading, pre-grading and stereoscopic projects.

The company has introduced the Nucoda Film Master ACES workflow with full HDR grading capability, including a rich toolset for dealing with color-critical workflows such as HDR capture from Arri and Red cameras. For stereoscopic projects, Auto Color and Align tools allow colorists to automatically match 3-D cameras using advanced geometry technology that provides morphing and color-matching capabilities.

Other new features for Nucoda include support for the latest Red Epic HDRx, Arri Alexa range and Sony F65 CineAlta camera (SRMaster format); a Deformable Shape Tracker; 64-bit application providing increased performance and stability when using large-format digital cameras and image manipulation at 4K; and updated features for the latest Avid and Apple FCP editorial workflows. Additionally, the Precision grading panel is now available in both curved and straight configurations.

Also in the Nucoda family, Digital Vision has launched Nucoda Look, a pre-grade assist station and deliverables platform with LUT export; and enhanced features for Nucoda Fuse, including full base-layer grading, a replace function to quickly change color tools, and LUT creation and export.

Digital Vision has also unveiled Phoenix Video, a powerful, cost-effective image-restoration software solution that allows content stored on videotape to be fully restored and ready for distribution across multiple platforms. The end-to-end Phoenix Video solution includes Digital Vision's DVO image-manipulation software







toolset for highly automated restoration and enhancement of video content stored on various tape formats, such as 1", U-Matic and Betacam SP, or later transferred to digital tape formats. The system handles image defects such as dropouts, severe noise, cross-color artifacting, line-sync problems (shifts/stretching) and more. Additional features include motion-compensated frame-rate conversion and high-quality upscaling as well as full support for common broadcast codecs. These new video-restoration tools have also been added to Digital Vision's high-end Phoenix Finish restoration offering.

For additional information, visit www.imagesystems.se/digital-vision.

Signiant, 5th Kind Streamline Asset Management

Signiant, a provider of intelligent file-movement software for media and entertainment, and 5th Kind, an innovator of asset-management and workflow solutions optimized for production environments, have partnered to integrate Signiant's accelerated file-movement capabilities with 5th Kind's Core platform, enabling dispersed production teams to ingest and share digital media files quickly and securely.

Deployed on internal networks accessed via the cloud, the scalable Core asset-management system features flexible modules to organize, search, view, track and tag any type of digital file, including footage and visual effects, and a flexible communication module for ongoing team collaboration. By seamlessly integrating with Signiant's accelerated digital file-transfer capabilities, Core increases user productivity while significantly reducing labor and overhead costs.

"5th Kind's Core platform is a unique digital production hub that offers clients end-to-end management support for not only media, but the full spectrum of production resources, including dailies, scripts, casting and marketing materials in a single system," says Matt Thomas, Western Region account director for Signiant. "We are pleased to work together with them to serve the needs of the media and entertainment community with capabilities that simplify and centralize access to media and materials in ways that basic point-to-point file transfer or traditional FTP solutions simply cannot."

"It's our goal to deliver the broadest asset management solution — from script to screen — tailored for the entertainment industry," adds Steve Cronan, CEO of 5th Kind. "Our collaboration with Signiant gives our studio, production and enterprise media customers the levels of centralized control, security, collaboration and ease of use that they require, and is already in use by our largest customer, Marvel Studios, to move time-sensitive [visual effects], audio and 3-D conversions across the supply chain."

For additional information, visit www.signiant.com and www.5thkind.com.

Paralinx Launches Arrow

Cinema electronics company Paralinx, LLC, has unveiled the Arrow uncompressed wireless video transmitter. Featuring a latency of less than 2 milliseconds, the Arrow transmits an uncompressed wireless video signal at distances up to 320' line of sight and up to 200' through obstructions.

"Our goal was to make wireless HD more accessible," says Dan Kanes, co-founder and CTO of Paralinx. "We wanted to keep the Arrow affordable to a wide range of filmmakers, yet still offer features like long range, low latency, small footprint and, most importantly, uncompressed 10-bit video."

The Arrow boasts an extremely compact size and minimal weight: the transmitter is roughly the size of a pack of gum, the receiver is approximately the size of a deck of cards, and the transmitter and receiver together weigh less than ¼ pound. Additionally, the Arrow is plug and play with any HDMI output from a camera or other device, enabling short connection times without any menus to navigate. All resolutions up to 1080 are supported, as are all frame rates up to 60, with capability for progressive and interlaced scanning as well as progressive segmented frame.



Thanks to automatic Dynamic Frequency Selection, up to six Arrow kits can be used in the same area simultaneously, and 256-bit encryption keeps transmissions safe. Also, the Arrow system is FCC and CE certified.

The Arrow is available for a recommended price of $1,199. For more information, visit www.paralinx.net.

Boxx Builds Meridian Family

Boxx Communications, the North American headquarters and official reseller for Boxx TV, has unveiled the Meridian Lite and Meridian Tallis systems.

The Meridian Lite is an entry-level RF HD camera system with zero-delay transmission. With its lightweight wireless transmitter, Meridian Lite supports 4:2:2 video, including all formats up to 1080/30p, and delivers uncompressed, artifact-free broadcast video and sound in synch. The system is also upgradable to Boxx TV's full-featured high-end Meridian wireless RF HD camera system.

The Meridian Tallis is an iris control and tally indicator accessory that complements any brand of broadcast camera on a wireless rig or Steadicam. The Tallis is small enough to mount on any camera, and the

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control knob gives accurate, high-resolution control to the iris. As Tallis only controls the lens, there is no black level or red/blue gain control, but at a price of around $3,500, it opens up a solution to productions where iris-only control is sufficient.

In addition to the Meridian System, Boxx offers Cobalt, which provides an alternative to COFDM systems with a bi-directional packet acknowledgment protocol that offers extremely robust transmissions, and Cerulean, which delivers the quality and reliability of full-HD uncompressed fiber link in a wireless environment.

Boxx's Meridian product line has been used on a variety of projects, including the series *Modern Family* and the upcoming James Bond film *Skyfall*. For additional information, visit www.boxxusa.com.

K 5600 Illuminates Joker 1600

K 5600 has introduced the Joker 1600, a 1,600-watt daylight fixture that produces an output comparable to a 6,000-watt quartz fixture. It is available in three configurations: Bug-Lite, Beamer and Zoom Beamer.

The Joker 1600 Bug-Lite has no optics. The fixture's bare-bulb output is optimal for use in light banks and lanterns, providing even distribution, eliminating hot spots and maximizing output. It can even be used pointing straight down.

The Joker 1600 Beamer includes an 8" specular reflector and a set of four traditional Par 64 lenses: Medium, Wide, Super-Wide and a frosted Fresnel. These lenses provide varying light patterns from 5 to 45 degrees and an extremely high output due to the reflector finish.

The lensless, focusable Joker 1600 Zoom Beamer boasts 15 to 65 degrees of even light output. The reflector was specifically engineered around the new 1,600-watt lamp, resulting in the most efficient performance possible.



All of the Joker 1600 units run off of a quiet electronic power supply that is smaller than comparable ballasts. Capable of running on a 15-amp/120-volt circuit, the electronic power supply is dimmable and has selectable frequency options for extreme high-speed shooting.

For additional information, visit www.k5600.com.

Panasonic Unveils F Series P2 Cards

Panasonic has announced the F Series next-generation P2 solid-state recording media. Available in 64GB, 32GB and 16GB P2 cards, the F Series supports recording of up to AVC-Intra Class 200 in the AVC-Ultra codec family, as well as all currently available codecs from existing P2 cameras and recorders, including AVC-Intra 100/50 and DVCPro HD/50/25.

F Series P2 cards offer fast transfer speeds of up to 1.2 Gbps, and they contain a flash memory error-correction system — equivalent to a RAID system — that greatly strengthens data retention reliability. All P2 cards use high-quality solid-state memory, extremely durable die-cast aluminum construction and impact-proof connectors. Additionally, P2 cards offer dependable performance during recording in all types of environments, as well as instant access and complete data compatibility in all P2 camcorders and workflow tools.



The 64GB (model AJ-P2E065FG), 32GB (AJ-P2E032FG) and 16GB (AJ-P2E016FG) F Series P2 cards are available now for a recommended price of $730, $499 and $399, respectively. For more information, visit www.panasonic.com/broadcast.



Sound Devices Mounts Pix 260

Sound Devices has introduced the Pix 260 production audio/video recorder and a V.2 firmware update for the Pix 240 portable audio/video recorder.

Based on the field-proven Pix 220 and Pix 240 recorders, the rack-mounted Pix 260 is a file-based audio/video recorder/player that replaces tape-based video decks in production and postproduction environments. Using Apple ProRes or Avid DNxHD codecs, the Pix 260 records and plays files up to 220 Mbps in high-quality 10-bit 4:2:2 video and 32 tracks of 48 kHz audio. Files from the Pix 260 are ready for direct import into Avid and Final Cut editing environments, eliminating time-consuming transferring and transcoding. Files can also play out of the Pix 260 for real-time applications.

The Pix 260 has a built-in 5" 800x480-pixel video display that allows users to view video and menu selections. It can be controlled by external RS-422 and via Ethernet through the embedded Web server, allowing for machine transport control over Ethernet-based networks. The Pix 260's ½-rack 2U chassis dimension allows it to be easily integrated into existing environments; the unit is powered by 10-27 VDC through its four-pin XLR connector.

Up to four SATA drives can be connected to the Pix 260 simultaneously; all four drives can be recorded to simultaneously for RAID-1-type redundancy and to eliminate the need for post-record copying when multiple copies are required. Additionally, the Pix 260 includes a built-in Ambient Clockit time-code generator/reader with genlock output for multi-camera and double-system sound applications; time code can be read from the SDI stream, the HDMI stream or from an external source.

Like the Pix 220 and Pix 240, the Pix 260 includes a scaler and frame-rate converter. Regardless of the incoming signal, the Pix recorders can record the signal after up, down or cross-conversion at the same rate or a different rate. Hardware-based 3:2 pull-down removal is included as well. ➢

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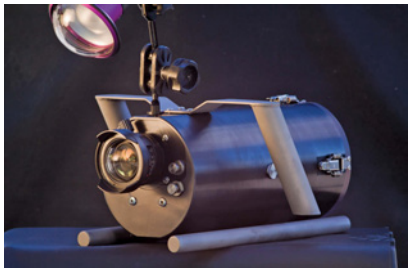
The firmware update for the Pix 240 recorder enables users to monitor images in varying exposures through Exposure Assist, a feature that includes false-color and zebra-stripes viewing. The update is also equipped with Focus Assist, which includes a peaking filter and 1:1 pixel zoom; monitor brightness, contrast and chroma adjustments; standard-definition recording (NTSC and PAL); and support for using simultaneous analog and SDI/HDMI audio inputs. These new features are available as a free firmware update to all Pix 240 users and can be downloaded through the company's website.

For additional information, visit www.sounddevices.com.

DeepX Takes Epic Underwater

Australian inventor and filmmaker Pawel Achtel has unveiled the DeepX underwater camera-housing system.

The DeepX system combines Red Epic cameras with Nikon Nikonos submersible lenses, which were designed expressly for underwater use, with no extra plastic or glass in front of them, thereby mitigating the image-quality degradation regularly associated with underwater housings and resulting in images that are sharp enough for the biggest cinema screens. The



DeepX houses the camera system while keeping the lens exposed to the water.

"The design is wonderfully simple," says underwater cinematographer Bob Cranston, who recently tested the DeepX housing off the coast of Catalina Island. "It is very small and easy to travel with … and uses great Nikon optics. It offers the best close-up capabilities I've seen so far."

The DeepX is available in the U.S. and Europe from Band Pro. For more information, visit www.bandpro.com and www.achtel.com.



CineBags Rolls Out CB40

CineBags has released the CB40 High Roller, the company's first bag to incorporate a retractable telescope arm and wheels. The bag is designed to accommodate the latest camera systems, including the Canon Cinema EOS C300, Red Epic, and all other medium-sized cameras and their accessories, including base plates, monitors, rods, mattebox, batteries and chargers. The bag also features a compartment to accommodate a 15" laptop.

"We are excited to have created a brand-new bag with a laundry list of features to cater to today's camera professionals," says Markus Davids, SOC, CineBags' president and product designer. "Modular camera systems require a bag that protects and organizes … and allows for maximum customization. The new CB40 High Roller is that bag."

For additional information, visit www.cinebags.com.

Vinten Unveils Vision Blue5 System

Vinten, part of Vitec Videocom, a Vitec Group company, has unveiled the Vision Blue5 pan-and-tilt head and tripod system. The Vision Blue5 is the latest member of the Vinten Vision Blue family and offers the same quality performance as the original Vision Blue system. The lightweight Vision Blue5 has a carrying capacity range of 12.1-26.5 pounds at a 100mm center of gravity.



The Vision Blue5 offers a cost-effective solution while delivering the quality and performance associated with Vinten's heads. The infinitely adjustable Perfect Balance and LF drag technology provides smooth control and consistent movement quality.

"The introduction of the Vision Blue5 represents the next generation of Vinten's pan-and-tilt heads and tripod systems," says Peter Harman, product manager for Vinten. "We've built on the successful performances of the Pro-10 and Vision 5AS heads and combined it with the accessibility and ease of use of the Vision Blue. It is a winning product that offers uncompromising performance."

For additional information, visit www.vinten.com.

Digital Anarchy Opens Beauty Box

Digital Anarchy has introduced Beauty Box Video 2.0 for OpenFX, bringing the skin-retouching plug-in to Assimilate Scratch and Scratch Lab, and Sony Vegas Pro and Movie Studio. Beauty Box now uses OpenCL running on ATI and Nvidia cards to automatically reduce wrinkles and blemishes while preserving important details and the natural skin texture. Fast rendering allows it to fit into any workflow pipeline. Version 2.0 also introduces a new smoothing algorithm that improves automatic masking and adds shine removal for hot spots on skin areas.

For additional information, visit www.digitalanarchy.com.

CamOne Explores Infinity

CamOneTec has launched the CamOne Infinity micro camera. Measuring 49mm x 42mm x 34mm, the camera records 30 fps in full-HD 1080p or 60 fps in 720p. Additional features include time-lapse and serial-photo functions, an integrated 1.5" screen with intuitive multilingual menu, a 2.0 Mini USB port, and AV and HDMI live outputs.

The CamOne Infinity's available accessories include a watertight case that enables clear shooting underwater. Additionally, a Wi-Fi module will soon be available, allowing users to control the camera via a smart phone.

The CamOne Infinity retails for $250. For more information, visit www.camonetec.com. ●

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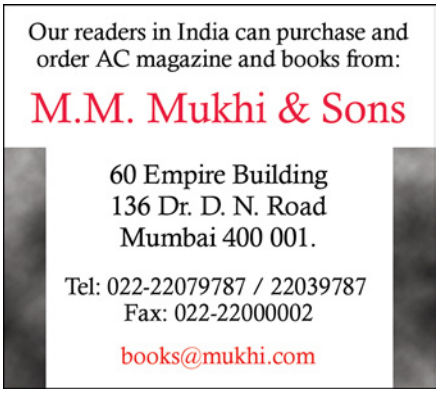


























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Clubhouse News













Top left: Associate member Simon Broad. Top right: Associate member Michael Hatzer. Middle: Rexford Metz, ASC leads a lighting workshop. Bottom: *AC* circulation director Saul Molina (left) with Umpeq-TV Director Gerardo Sánchez Zarraga.

Broad, Hatzer, Priestnall Named Associates

New associate member **Simon Broad** was born in Kent, England. He began his career at Samuelson Film Service in London, where he served as a crane operator and insert-car driver before eventually joining the board as director of the feature-film liaison office. In 1990, Broad joined Arri Media as sales and marketing manager. Seven years later, he took a break from equipment rental to run a corporate entertainment group and then serve as an agent for cinematographers at ICM. In 2003, he moved to the United States to work as vice president of marketing for Arri CSC. He was named president of the company in 2010.

New associate **Michael Hatzer** has been part of the Hollywood post community for more than 25 years. He began his career at Deluxe Laboratories, where he worked as an optical printer, negative cutter, dailies color timer, trailer timer and feature color timer; he photochemically timed more than 125 features, hundreds of trailers and hundreds of thousands of feet of dailies. In 2005, Hatzer became a digital-intermediate colorist at EFilm in Hollywood. Five years later, he joined Technicolor Creative Services in Hollywood as a senior digital-intermediate colorist. His current title at Technicolor is supervising digital-intermediate colorist.

New associate **Sarah Priestnall,** the vice president for marketing development at Codex Digital, is a 25-year veteran of the post industry. She began her career as a runner with the British post facility Molinare, and went on to work at various post facilities in London before moving to Los Angeles in 1991. She spent nine years with Kodak, where she was the product manager for Academy Award-winning Cineon software. Prior to joining Codex, she held posts at Cinesite and Hollywood Intermediate.

Metz Leads Workshop in Mexico

Henner Hofmann, ASC, AMC and Laura Manghesi recently welcomed **Rexford Metz, ASC** to Mexico City's Centro de Capacitación Cinematográfica, where Metz led a workshop with students from CCC as well as Centro Universitario de Estudios Cinematográficos. Working on a soundstage at Churubusco Studios, Metz led the students through numerous lighting setups, and the students shot footage of the results with film and digital cameras. On the third day of the workshop, Metz and the students screened and discussed their footage.

AC Attends Mexico City Show

AC trekked south of the border to attend the Expo Cine Video Television trade show in Mexico City, where Umpeq-TV Director Gerardo Sánchez Zarraga invited the magazine to share booth space. Saul Molina, *AC* circulation director, and Alex Lopez, *AC* circulation manager, both made the trip. Molina and Lopez note that Michael Ibañez of 16x9 Inc. and Nela Fernandez Gaos of Equipment & Film Design helped to make the trip a success.

Cinematographers Invited to Join Academy

The Academy of Motion Picture Arts and Sciences recently extended membership invitations to 176 artists and executives who have distinguished themselves by their contributions to theatrical motion pictures. The cinematographers invited to join were (in alphabetical order) Florian Ballhaus; **Oliver Bokelberg, ASC, BVK**; Anna J. Foerster; **Larry Fong, ASC**; Alwin Küchler, BSC; Toyomichi Kurita; **George Mooradian, ASC**; Guillaume Schiffman, AFC; and **Terry Stacey, ASC**.

AMPAS also recently elected its Board of Governors for 2012-'13. First-time governor **Dante Spinotti, ASC, AIC** joins **John Bailey, ASC** and **Richard Crudo, ASC** in representing the cinematographers' branch. Additionally, **Richard Edlund, ASC** and associate member **Craig Barron** continue to serve their three-year terms as representatives of the visual-effects branch.

Photo of Clubhouse by Isidore Mankofsky, ASC; lighting by Donald M. Morgan, ASC. Golf photos by Matt Turve. CCC and Expo photos by Alex Lopez.

Storaro Wins Vitec GTC Award

The Guild of Television Cameramen, an independent, non-profit, international organization, recently celebrated its 40th anniversary and announced the winners of the 2012 Vitec GTC Awards. **Vittorio Storaro, ASC, AIC** won an Award for Excellence for his work on the telefilm *Rigoletto a Mantova*.

Additionally, three companies were presented with GTC Seals of Approval: MTF Services Ltd., for its Nikon to Sony F3 adapter; Easyrig AB, for its Easyrig 2.5 and Cinema 3 camera supports; and Arri, for the Alexa camera system.

Members, Guests Hit Links

The ASC recently hosted its 29th annual Golf Classic at the Brookside Golf Course. Coming off the fairway, the results for active and associate members were as follows: active members low net: **James Bagdonas, ASC** (71); 2nd low net: **Jack Green, ASC** (75); 3rd low net: **Gil Hubbs, ASC** (75); active members low gross: **Michael Watkins, ASC** (81); associate members low net: **Joseph Ball** (72); 2nd low net: **Steven E. Manios Sr.** (72); 3rd low net: **D. Brian Spruill** (74); and associate members low gross: **David Dodson** (80).

The 2012 Golf Committee was chaired by **Bradley Six, ASC** and co-chaired by **Howard Anderson III, ASC**; the committee members were **Russ Alsobrook, ASC**; **Bobby Byrne, ASC**; **Gil Hubbs, ASC**; **Daryn Okada, ASC**; **Woody Omens, ASC**; and **Owen Roizman, ASC**.

The Society thanks all of the tournament patrons, contributors and gift angels, including Arri, Arri CSC, Chapman/Leonard Studio Equipment, Cinelease, Company 3, Deluxe Laboratories, Eastman Kodak Company, Encore, FotoKem, Fujifilm North America Corp., Fujinon, Keslow Camera, Kino Flo Lighting Systems, Mac Tech LED Lighting, Panavision and Tiffen, for helping to make the event a success.

Arri, NYU Present Volker Bahnemann Award

Arri recently presented the second annual **Volker Bahnemann** Cinematography Awards to Hunter Baker and Pepe Avila Del Pino in the undergraduate and graduate divisions, respectively. The award, which is named after Bahnemann, a retired associate member and the former president and CEO of Arri, is presented to cinematography students at New York University's Tisch School of the Arts Maurice Kanbar Institute of Film and Television. Honorees are selected by faculty and are awarded production grants to further their cinematographic work.

"After having retired from active participation in the industry I love, there is nothing more gratifying than to be exposed to and involved with these enormously motivated and talented young filmmakers," says Bahnemann. "Their imaginative work is stunningly good and displays a high level of knowledge of the entire complex process. I am very happy being able to contribute in some small manner to their development."

Schwinzer Joins ZGC, Cooke Optics

Production equipment supplier ZGC and precision lens manufacturer Cooke Optics have appointed ASC associate **Juergen Schwinzer** to a wide-ranging sales and technical position. Schwinzer previously spent 43 years with Arri.

ASC associate **Les Zellan**, the chairman and owner of Cooke Optics and president of ZGC, says, "We are delighted and honored to welcome Juergen to the team. He is well known and respected throughout the world for his incomparable technical knowledge and his passion for the filmmaking world, and ZGC and Cooke will benefit greatly from his expertise and global contacts." ●





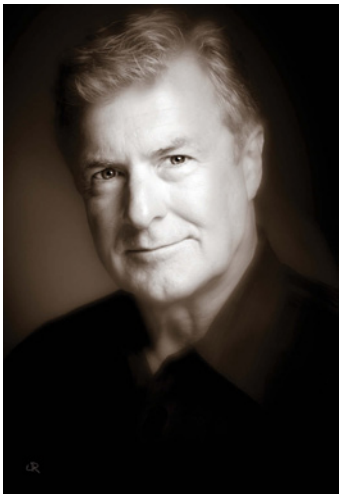




From top: Participants warm up before the ASC Golf Classic; the players set off in their golf carts; associate member Mike Morelli (left) and Jack Green, ASC line up the next hole; ASC associate Juergen Schwinzer.

Close-up John Newby, ASC

When you were a child, what film made the strongest impression on you?
Two very different ones. When I was 9, William Wyler's *Ben-Hur* (1959), shot by Robert Surtees, ASC, impressed me with its depth of color, action and spectacle. When I was 12, my brother took me to an art-house cinema to see Orson Welles' *The Trial* (1962), shot by Edmond Richard, AFC, which opened my eyes to a maze-like dreamscape of crisp black-and-white images with Dutch angles on short lenses.



Which cinematographers, past or present, do you most admire?
It's so hard to limit this list. ASC members Karl Struss and Charles Rosher for the camera moves in *Sunrise*; Raoul Coutard, AFC for his work with Godard and Costa Gavras; Conrad Hall, ASC for his use of color in *The Day of the Locust*; Haskell Wexler, ASC for the sense of immediacy and movement in *Who's Afraid of Virginia Woolf?* and *Medium Cool*; Owen Roizman, ASC for the *vérité* style of *The French Connection* and the beautifully lit urban interiors in *Network*; and Robert Elswit, ASC for the unique color treatments in *Syriana.*

What sparked your interest in photography?
My mother gave me her Kodak Brownie Hawkeye bellows camera when I was 9. I used the 'light meter' on the film box and was amazed by the images that came out of that camera. I was also fascinated by each week's issue of *Life*, which had real-life images from around the world that were so well shot.

Where did you train and/or study?
At Boston University, while minoring in film/television production, I apprenticed to become a licensed projectionist, running old arc-light projectors in 3,000-seat theaters. I was entranced by that beam of light passing through a 35mm rectangle onto a huge screen. Later, I ran the film labs and edited news film at Boston TV stations. When *The Brinks Job* came to Boston, I worked on huge night scenes as one of 16 arc-lamp operators. I was getting closer to the camera, but I was still 75 yards away!

Who were your early teachers or mentors?
Pete Chvany, a film professor at Boston University; cinematographers Brian Heller and Mike Fash, ASC, for whom I worked as a gaffer on numerous projects; and Bobby Byrne, ASC, who taught me so much about shot concepts and operating.

What are some of your key artistic influences?
Most of all, the light I see in the world each day, but also Godard's and Bergman's films; Goya's night exteriors; El Greco's color; Magritte's magic hour; an old steel mill I once worked in but wasn't allowed to photograph; Nic Roeg's radical camera style in *Performance*; and the visual dynamics of Spike Lee and Ernest Dickerson, ASC, with whom I operated on two features.

How did you get your first break in the business?
Ed Hershberger got me on a job loading PhotoSonics cameras for car crashes at a test track.

What has been your most satisfying moment on a project?
On a daily basis, watching my crew execute a complicated shot — the mechanics of the camera move, focus, cued nets and dimmers, all in sync with the actors — is still magic to me.

Have you made any memorable blunders?
While operating for Francis Kenny, ASC, on *Sweet Bird of Youth*, I cut the camera and stepped off the dolly to adjust a cocktail glass, then noticed that Nic Roeg hadn't yet called 'Cut,' and Elizabeth Taylor hadn't finished her last beat of the scene.

What is the best professional advice you've ever received?
Know what you want to *see* in the shot before you plan logistics.

What recent books, films or artworks have inspired you?
The Iranian film *A Separation*, Gary Shteyngart's novel *Super Sad Love Story*, and the LACMA exhibit *In Wonderland: The Surrealist Adventures of Women Artists in Mexico and the United States*.

Do you have any favorite genres, or genres you would like to try?
An urban political thriller set in the 1920s.

If you weren't a cinematographer, what might you be doing instead?
Landscape lighting and design, or political journalism.

Which ASC cinematographers recommended you for membership?
Francis Kenny, Steven Poster and Ed Pei.

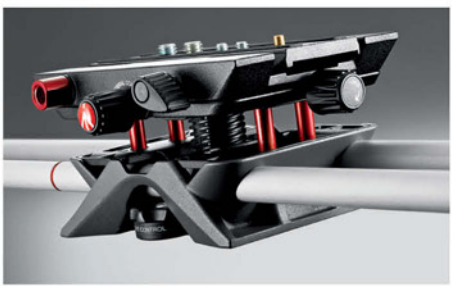
How has ASC membership impacted your life and career?
It's quite an honor to be part of the 93-year-old ASC as we move through the digital era. And the fact that we can get together and talk is fantastic, because cinematographers don't usually work with each other. ●

Photo by Owen Roizman, ASC.

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