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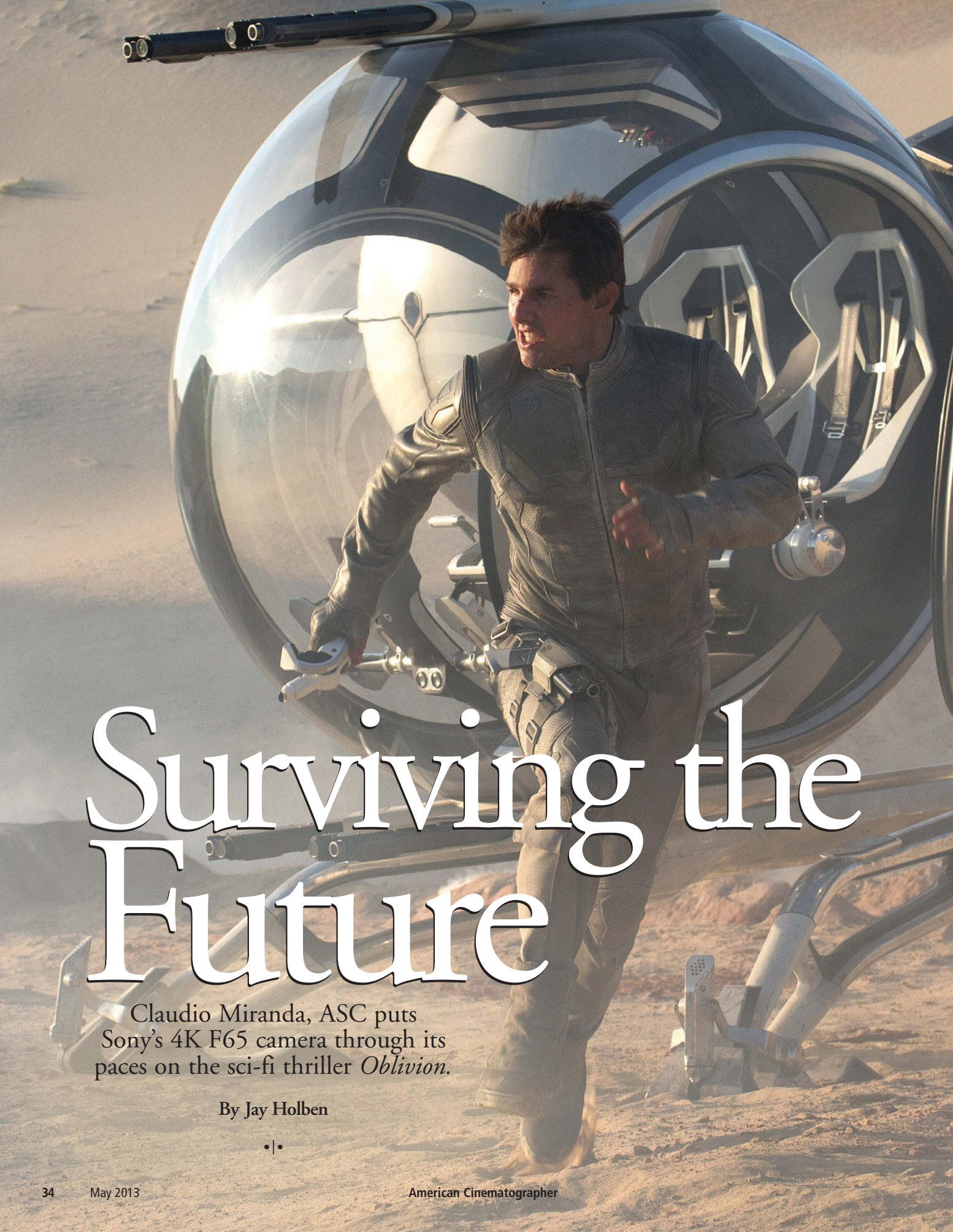

Surviving the Future

Claudio Miranda, ASC puts Sony's 4K F65 camera through its paces on the sci-fi thriller *Oblivion.*

By Jay Holben

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Opposite: Jack Harper (Tom Cruise) runs for cover in a scene from *Oblivion*, directed by Joseph Kosinski and shot by Claudio Miranda, ASC. This page, top: Harper maneuvers through unknown territory. Middle: Julia (Olga Kurylenko) joins Harper after she is found in a downed spacecraft. Bottom: Kosinski (left) and Miranda line up a shot.

In *Oblivion*, which is set in the year 2073, the Earth lies in ruins from an alien invasion that happened several decades earlier. The surviving humans have long since been evacuated, and robot drones patrol the planet, searching for any remaining resources that can help the human race. Jack Harper (Tom Cruise) has been tasked with repairing the drones, and as his assignment draws to its close, he is shocked to stumble upon another human, a woman (Olga Kurylenko), in a downed spacecraft. Suddenly, he is attacked by a group of humans, the Scavs, and taken captive. Upon meeting the Scavs' leader, Malcolm Beech (Morgan Freeman), Harper discovers there is an entire city of people inhabiting a secret underworld on the planet.

Written and directed by Joseph Kosinski, *Oblivion* is based on the graphic novel Kosinski co-wrote with Arvid Nelson. It is the director's second feature with cinematographer Claudio Miranda, ASC, a collaborator on *Tron: Legacy* (*AC* Jan. '11).

Production began in March 2012, three months after Sony began shipping its F65 digital-cinema camera, and *Oblivion* became one of the first features to use it. "Every time I do a new project, I do tests with many cameras to find the one that's best for that project,

Photos by David James, SMPSP, courtesy of Universal Pictures.

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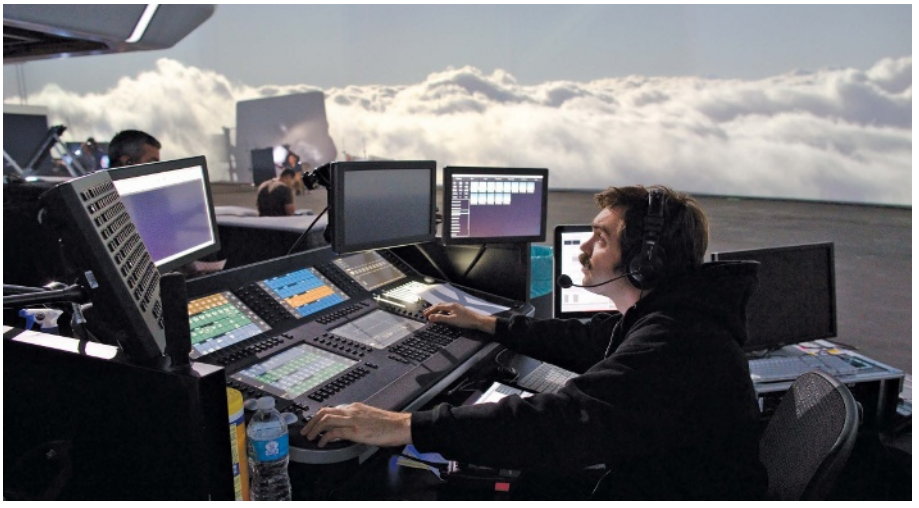


Top: Harper and Julia look out from Harper's residence 2,000' above the ground. Middle: The camera is positioned inside the set, which was surrounded by a 494'-wide-by-42'-tall projection screen that enabled interactive sky effects. Bottom: Projection programmer Jack Alexander controls the sky onstage.

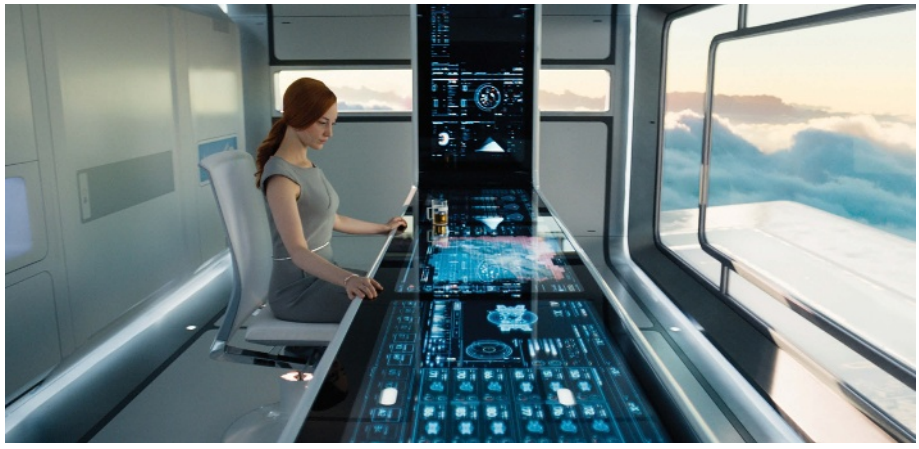
and we tested just about every camera out there for *Oblivion*," says Miranda. "Sony cameras definitely have a particular look, one that's a little cooler than, say, the Arri Alexa, and Joe really loves that look. He liked what the [Sony] F35 gave us on *Tron*, and he was really a fan of the F65 in our tests for *Oblivion*.

"So, we ended up being some of the first guinea pigs for the F65 in a production scenario," he continues. "It gives you a fantastic image, but it's a large camera, and the ergonomics aren't necessarily the most user friendly. When we wanted to put body mounts on Tom Cruise or do quick Steadicam moves, we used Red Epics instead. But about 98 percent of the movie was shot with the F65."

Miranda captured in 4K with the F65 and in 5K (at 3:1 compression) with the Epic-M and Epic-X, using Arri Master Primes and Fujinon Premiere PL zoom lenses. (The picture

was finished in 2K and was cropped to 2.40:1 for standard theatrical exhibition and 1.90:1 for Imax.) "We considered shooting anamorphic, but I wanted to use faster lenses," he explains. "We used the Master Primes for most of our work, but the Fujinon [Premier] zooms were very impressive, and we used them for crane work and helicopter work, just to make sure we had a good variety of focal lengths. When I did side-by-side lens tests in prep, I found the Fujinons are actually sharper than the Master Primes, which was hard to believe! We had all four of them: 14.5-45mm [T2], 18-85mm [T2], 24-180mm [T2.6] and 75-400 [T2.8]. A couple of shots called for a telescope point-of-view, and we put a doubler on the 75-400mm, giving me an 800mm. I couldn't believe how sharp it was."

Exteriors were shot in volcanic-rock terrain in Iceland, but the filmmakers built all their sets on stages in Baton Rouge, La. One of the main sets is Harper's residence, a glass structure 2,000' above ground on a tower. It offers expansive views of the sky, which is colored by constantly moving clouds, the sun's movement and atmospheric conditions. Miranda recalls that he and



Top: This frame grab shows the exterior of Harper's home in the clouds. Middle: Harper's partner, Victoria (Andrea Riseborough), studies an instrument panel. Bottom: The camera crew works in front of the projected background.

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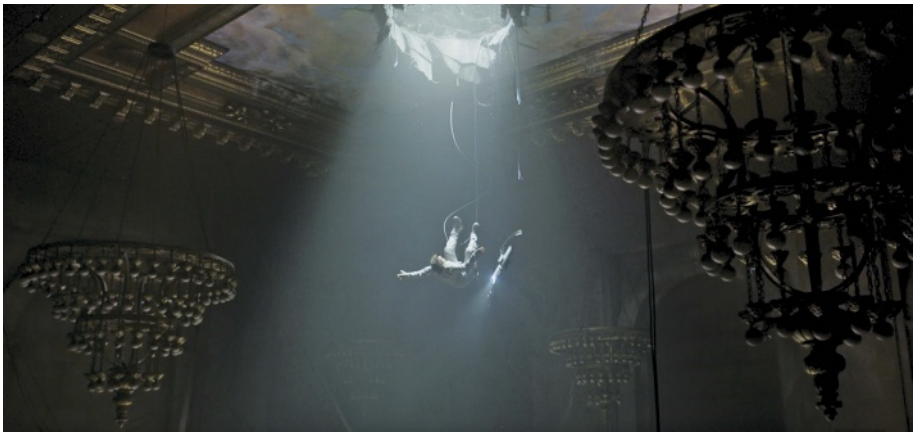

Top: Harper surveys the landscape from the vantage of his helicopter/spaceship hybrid. Bottom: Harper accidentally discovers the remnants of the New York Public Library.

Kosinski began discussing the sky tower long before their official prep started. "We wanted to stay away from blue-screen and do as much in-camera as possible," says the cinematographer. "Neither of us likes the limitations blue-screen composites put on a set. Harper's place is supposed to look futuristic and polished, and we didn't want to make all the surfaces dull to avoid blue [light] pollution. We didn't want to end up in a situation where most of the set was made of CGI."

Miranda suggested going "old school" in a very modern way. Using the concept of frontscreen projection, he proposed surrounding the set with projection screen and utilizing high-end video projectors to create the sky all around the set. Production Resources Group, a company that specializes in concert tours and other specialized events, brought in 21 Barco FLM-HD20 20,000-lumen 1080 HD projectors, along with 11 custom Mbox Extreme v3 media servers, to create a 270-degree projection around the entire set. It was 494' wide by 42' tall; more than 60 layers of video were combined to create a final blended image resolution of 18,288 x 1080 pixels.

"We sent a crew out to Hawaii to shoot sky and cloud plates with three Red Epics, and those were stitched together to create 15K motion plates for the projectors," explains Miranda. "We had lots of different looks, including blue skies, fog and sunsets. All of the footage played back at about triple normal speed, so the clouds had a little extra dynamic energy to them. We loaded all the footage into the media servers, and then we could just press 'Play.'

"With all the sequences loaded on the server, we had the ability to fully control the sky. If we wanted to change the sun direction, we simply called up a different clip, or borrowed one part of the scene from the other side of the projection. We could flip and flop cloud formations around [to achieve] the most dynamic looks, and we could get it all in-camera in real time.

"This meant our production designer, Darren Gilford, didn't have to compromise in his design for the set — we could have all the glass and shiny surfaces we wanted!" continues

Left: Harper is interrogated by Malcolm Beech (Morgan Freeman), the leader of an insurgency group on Earth. Below: For Beech's introduction, Freeman lit himself with a single match.

Miranda. "And, if we *had* to have a bluescreen, we could just switch one or more projectors to blue, and that gave us an instant bluescreen anywhere we needed it. It was also liberating for Tom and the other actors because they weren't acting in a blue void; they were experiencing the environment in a very real way.

"With this method, I always knew what the background would be and how to compose for it. I actually used the light from the projections for much of the lighting in the sky tower. It gave us a huge source that was very beautiful natural light. In some cases, we'd use some additional bounce to bring that light closer [to an actor], but that was it."

By testing the projection rig extensively in prep, Miranda determined that each projector could only cover a 42'-wide area and still give him the brightness he needed for exposure. "I was calculating 1/3 under a T2 — that became my base mark," he says. "Then, I knew we'd need a 4-to-6-foot overlap for each of the images to make the transitions as seamless as possible. We could deal with some distortion from time to time because we were projecting clouds, which are very forgiving, but if there were any visible seams, we were dead."

Even a production as large as *Oblivion* has a finite budget, and the projection rig was a considerable expense. "I had to find the most economical yet effective way to cover the area we needed to cover," says Miranda. "This meant that the projector was sometimes horizontal and sometimes vertical. I also figured I would lose about 1/3 of a stop from all the glass, so I planned to shoot everything at a T1.4 1/3. That was right on the hairy edge of where I was getting exposure, but if I wanted to increase that, we would have needed twice as many projectors, and that was out of the question."

Miranda considered asking the

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Top: Harper approaches Julia's downed spaceship. Bottom: Miranda operates the wheels on a remote camera control.

art department to paint the projection wall gray, but he went with bright white instead to maximize the reflection off the wall. In a typical front-projection scenario, a gain or retro-reflective screen might be used where the projection surface has a very high reflectivity, but that wouldn't work in this situation because the wall was curved and would be seen from many different angles.

The next task was determining where to place the projectors, and the filmmakers found that mounting them directly under the set worked best. Custom housings were created for each projector that allowed cool air to be pumped in and featured a small aperture for the lens to poke out. Individual mirrors were mounted at each projection port so the beam could be adjusted — panned and tilted — without requiring an adjustment to the position of the projector or the housing. These housings were mounted under the sky tower's helipad and in various places both above and below the set to fill the projection wall. Miranda recalls that it took 10 technicians nearly three weeks to install the projectors and get them all synced and custom-warped to the shape of the projection wall to create a seamless image.

Another bonus to avoiding blue-screen composite was that Miranda was free to incorporate atmosphere in the set. "I like to use smoke quite a bit, and we were able to put some in the sky tower," he says. "In one scene, the characters are literally fogged in, and we were able to run the projectors in the background and put real fog all around the set. The light interacted with it in a very real, beautiful way. ➢

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Top: The crew employs a crane to get a shot of Cruise on location in Iceland. Bottom: Kosinski (front) consults with Miranda (second from right) and other crewmembers.

"How to work with the projections occupied my mind for a long time, and I studied previsualizations and 3-D models and did a lot of other research to figure out how this would come together," he adds. "If we did a dolly move, would the projection look false? Would it look good if the clouds were always moving? In the end, the result is really amazing. It doesn't draw your attention; it just feels very real. When I first walked out onto the set with the projection going, I thought, 'Wow, this works way better than I thought it would!' It's definitely a technique Joe and I will take with us to other productions."

Harper spends much of his time on Earth exploring, and in one scene, he discovers the remnants of the New York Public Library. It lies underground, buried by rubble and debris from the war, so Harper descends into it through a hole in the ceiling. A shaft of daylight coming through the hole lights the scene.

"I didn't want that shaft of light to be really hard and defined," says Miranda. "I wanted it to feel softer, more ambient. Interestingly, we had to shoot this before we went to Iceland to shoot the exteriors, so I had to guess what the light quality would be like. I imagined that even if it were a sunny day, [the shaft] would feel more like ambient light than direct light."

The space above the set was so limited that Miranda knew he wouldn't be able to rig large fixtures and diffuse them, so instead, he had his crew rig a 12'x20' soft silver reflector to the stage ceiling and then bounce three 18K HMIs into it. "Each of the 18Ks was about 30 feet from the hole, shooting up into the silver to bounce down," says the cinematographer. "The distance between the hole and the stage ceiling was about 10 feet, but this solution created the feeling that the sky was miles above the hole."

Once Harper drops into the library, the lighting becomes even simpler. "We basically lit that with the flashlight Tom was carrying," says Miranda. "We had a couple of small 'cheater' lights in the library, but they only did about 5 percent of the lighting. We hid white cards around the set and asked Tom to hit them, and we also had grips moving around with muslin sheets to reflect light. We were mostly wide open on the Master Primes, rating the F65 at 800 ISO."

When the Scavs capture Harper, they tie him to a chair in the bright

spotlight of an interrogation chamber. The spotlight was a household LED R40 Par, which "had a cold, synthetic feel that I really liked," says Miranda. "Joe wanted the rest of the room to be pitch black, so that light was all we used. Then, when we see Beech for the first time, he lights himself with a single match. That reflection of Tom in Morgan's glasses was actually done in-camera. We just moved Tom a little closer, kept him lit with the LED lamp and got that beautiful reflection. I joked with Tom that he was the world's most expensive bounce card!"

When the lights in the room suddenly come on, Beech's army of survivors is revealed. Hundreds of people stand in the rafters around the room. Some architectural lights were worked into the set for this moment, but keying the crowd was a large soft box overhead holding six Kino Flo Image 80s. "Even that was too much light, so I turned off all but one bulb on each of the Image 80s," Miranda recalls. "That's one of the wonderful things about shooting digitally: you can work in very low-light situations and get some beautiful images. I love film, but I know I couldn't have shot *Oblivion* on film."

The filmmakers worked with two F65s throughout the shoot. Miranda says he prefers to incorporate the B camera as additional coverage after the A camera is set. "If we can get B cam in there for a second shot, that's great. Sometimes, if the scene is emotional, we'll do dueling coverage, but I prefer to avoid that. We did it for a couple of scenes between Tom and Olga so we could capture both performances in the same shot. It's nice for the director to be able to optimize that connection between the actors. It's not always the best for lighting, but it is sometimes more important for the performances and the film as a whole."

Harper uses a helicopter/spaceship hybrid to get around Earth, and in one sequence, he ends up in an aerial dogfight in a canyon. Miranda had his gaffer, Chris Strong, and key grip, Michael Coo, build three moveable walls of light that were each 40'x60' and lined with 50 Philips iW Blast TR intelligent LED fixtures. One wall went on each side of the ship's cockpit, and one was positioned above it. The iW fixtures have a combination of LED lamps so that they can color shift from 2,700°K to 6,500°K on command. This gave Miranda the ability to create whatever hue of interactive lighting he desired. He recalls, "We could move the walls around as needed, and all the fixtures were connected to a dimmer board, so we could program chases and light changes. I wanted them moveable so we could adjust them around to the right angle on the action." Direct sunlight was created with PRG's Bad Boy automated lights.

Miranda's team used previz sequences of the CG canyons that the

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Miranda checks the crane-mounted Sony F65.

ships would be flying through to program the lighting patterns. "It took a couple of weeks to program all the different looks we wanted," says the cinematographer. "If the ships came out of clouds into the sun, we could mimic that with the iW fixtures. If they dived into the canyon, then we'd go with just the toplight. If they were spinning in the canyon, we could easily shift to sidelight."

Harper's ship has a pair of plasma cannons, and the crew rigged the trigger of Harper's firing control directly to a bank of iW fixtures in front of the ship. When Harper fired, the lights would erupt with interactive plasma bursts. "We made the gunfire a little warm, mixing in more tungsten LED than daylight," Miranda adds.

Asked about the image workflow on set, Miranda states, "I don't believe in on-set color correction. I will switch back and forth between raw and a look-up table that has light contrast and color [modifications] so that it doesn't look horrible. I might dial in my monitor a bit to the look I want, but I don't sit in a trailer or a tent and spend time coloring the image on set — and I don't want someone doing it for me, either. I think the set is a confusing place to do that type of work, but maybe that's just me.

"If I can, I will spend time after work dialing in a look for the day's footage, and on this project, I spent

time in editorial doing basic correction on the Avid for our early friends-and-family screenings so they would have a good image to look at, but I stay away from doing it on set. I can understand doing that if you know you're not going to be involved in the final color work, but when I know I'm going to spend several weeks with a colorist on the final grade, I don't see the benefit of taking the time to do that on set."

Oblivion was posted at Skywalker Ranch in Marin County, Calif. Technicolor colorist Mike Sowa brought a Discreet Lustre to the site so Miranda could work side-by-side with Kosinski as the director moved back-and-forth between sound mixing and color sessions. "It's very convenient when the director has everything in one place like that, and it was great to be able to get to the grading without driving all over L.A.," says Miranda. "I spent two weeks with Mike on the final grade. They set us up in housing, and I had my family up there with me, so it was a very comfortable and relaxing way of working. It was a wonderful way to finish off the great experience I had on this film." ●

The crew captures a sunset vista in Iceland.

TECHNICAL SPECS

2.40:1 and 1.90:1 Imax

Digital Capture

Sony F65; Red Epic-M, Epic-X

Arri Master Prime, Fujinon Premier