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FILM AND DIGITAL TIMES

Art, Technique and Technology in Motion Picture Production Worldwide

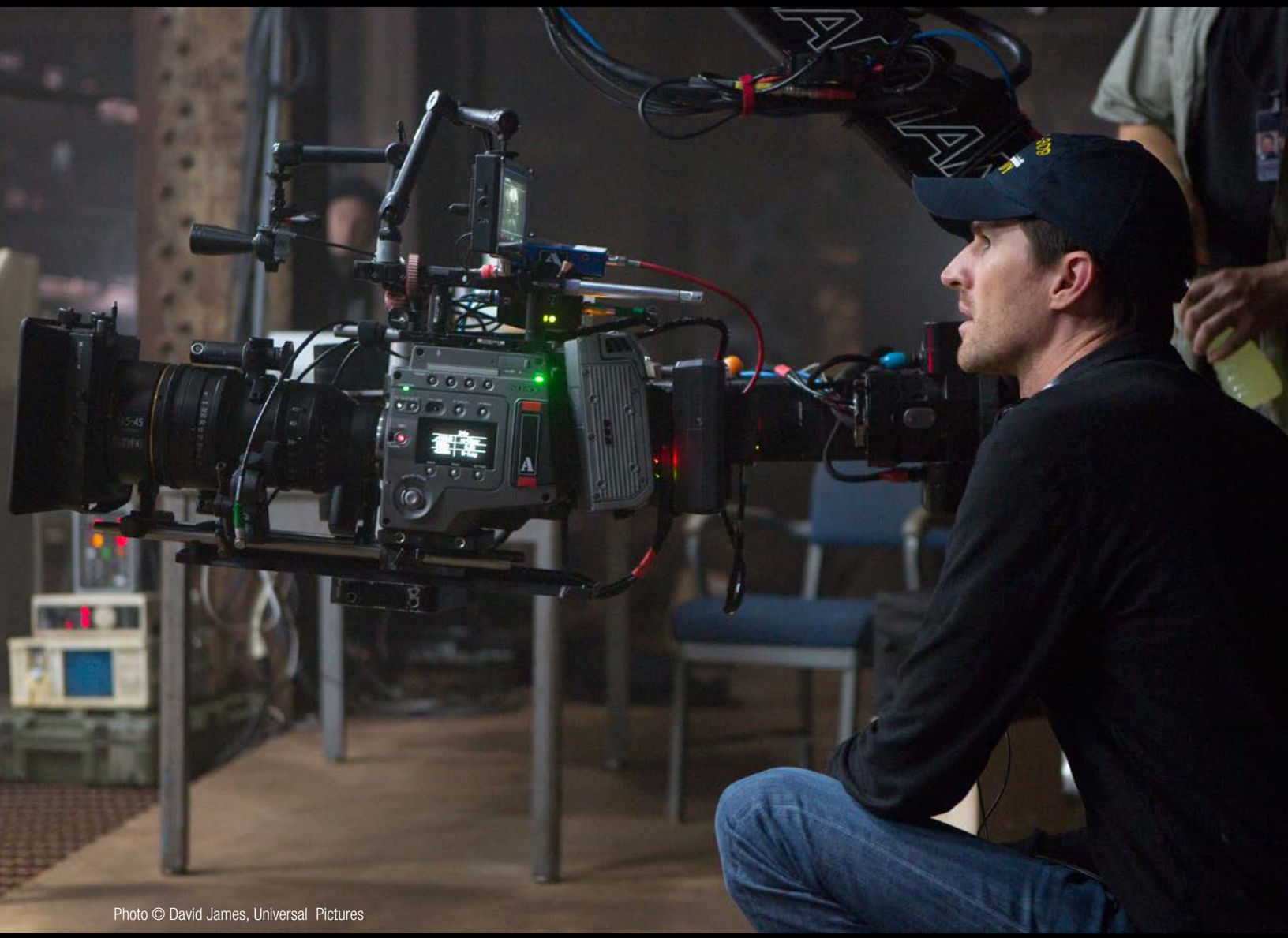
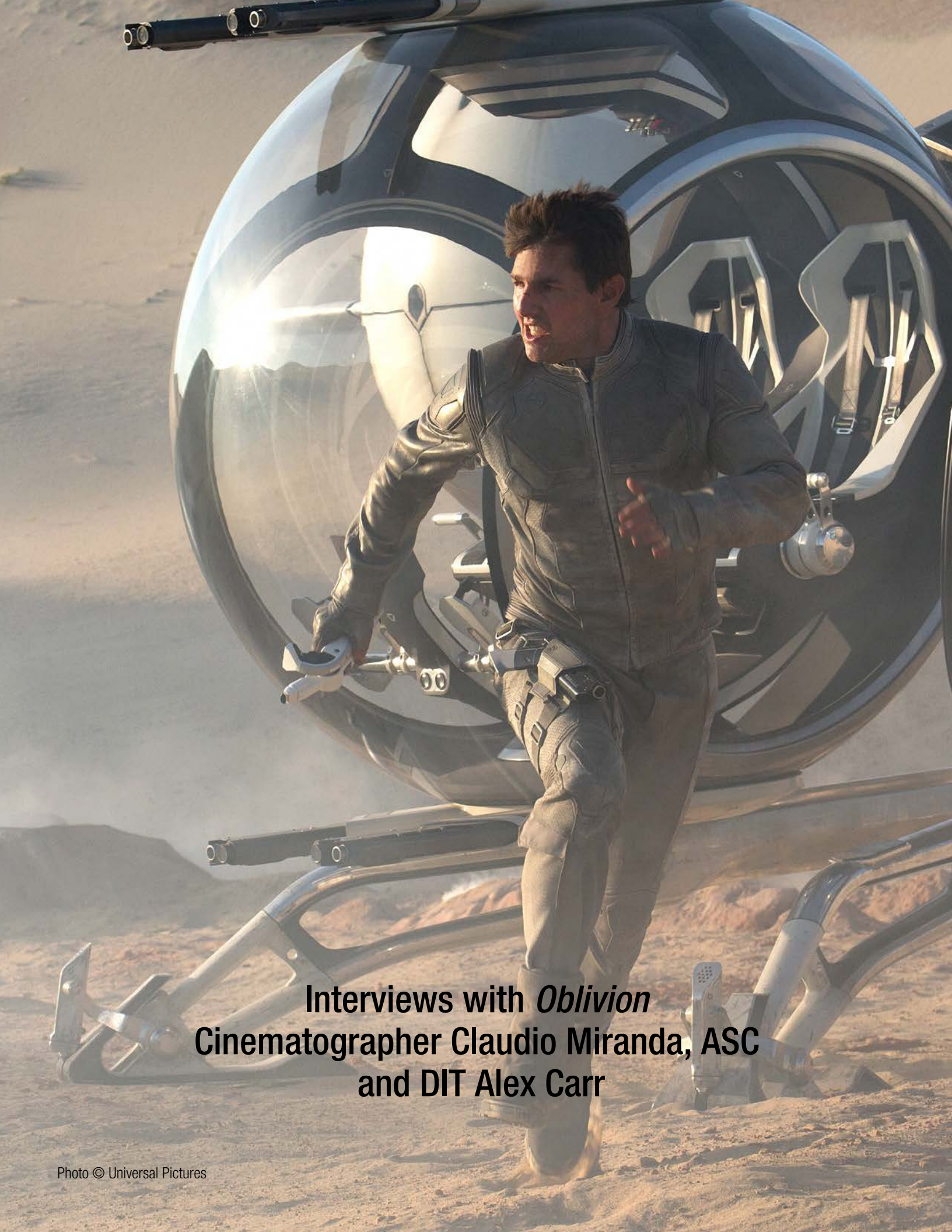


Photo © David James, Universal Pictures

Oblivion

Shot with SONY F65



Interviews with *Oblivion* Cinematographer Claudio Miranda, ASC and DIT Alex Carr

Claudio Miranda, ASC on *Oblivion*

Claudio Miranda, ASC with Sony F65,
Fujinon Premier 24-180 Zoom, Chapman G3 Head
Photo © David James, Universal Pictures

JON FAUER, ASC: *Oblivion* will be the first release of a major motion picture shot with a Sony F65 camera. So far, few of us have seen its capabilities on a big screen. Tell us about the camera and lenses.

CLAUDIO MIRANDA, ASC: On *Oblivion*, we used the Sony F65. For lenses, on exteriors we used Fujinon Premier zooms. They are ridiculously sharp. They're sharper than our primes. A zoom sharper than a prime? That's incredible. Those Premier zooms are expensive but worth it.

For interiors, when we needed a lot of stop, we used the ARRI/ZEISS Master Primes at T1.3.

Why did you need fast lenses?

We did something kind of unique in *Oblivion*. We were tired of blue screens. We knew what blue screens would mean to the production design of the set. There's a scene in the movie with a building that's up in the clouds. It's an all-glass structure, very modern and very open, with very shiny surfaces. Usually, if you get a situation like that and you're doing blue screens, VFX will say, "Okay, let's take all the glass out."

In fact, that's what they told us to do, "Take all the glass out and consider using more matte surfaces and get away from shiny things." Because, with so much glass things get too shiny. When using blue screen the set just disappears and then they end up having to digitally reconstruct the set in post, which gets expensive.

We wanted to try something kind of different. Joe Kosinski (Director) and I were playing around with this idea on *Tron*. "For *Oblivion*, we had a 500 foot wide by 42 foot tall screen with 21 projectors. This gave us real-time 15K motion picture front projection."

We sent a second unit to the top of a volcano in Hawaii for two or three weeks and they shot cloud formations from this high vantage point. We took all that footage and stitched the 3 cameras together and created this 15K image that would play live.

Behind the actors was a real environment. The actors loved being in it. Because it was such an expensive thing and every stop counted, we used the Sony F65, at 800 ASA and I was shooting at T1.3-2.0 split. If I needed more stop, that would have doubled the projectors and all of a sudden that would have been 42 projectors, and that would not have made the producers happy.

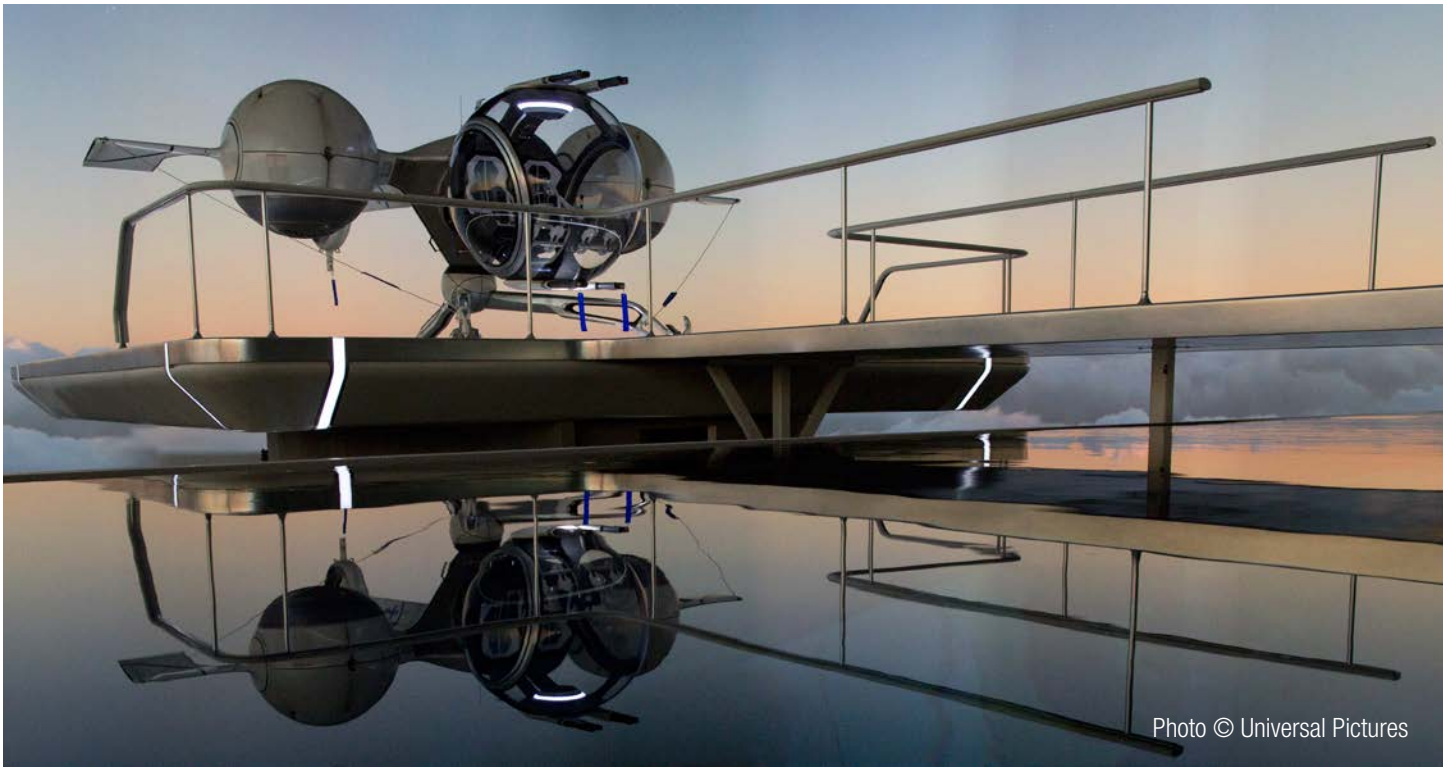
The idea of going for 21 projectors to make this work was scary enough. But it was something special.

You're in that set and you could change the lighting anytime. You just call up a certain scene. You have a sunrise and you could put the sunrise on the left side, right side, anywhere you wanted. You could rotate the whole image around. You could move clouds if you wanted more on one side, or put them on the other side for a reflection somewhere else. And I could light with it, too. I could make a little hotspot on the top and have light pour in. It was very amazing to be in this glass world without a reflection problem.

The basic thing I had to get rid of was the camera's reflection in the windows. But that was easy. The scene is really beautiful. There's a shot where Tom Cruise is coming from inside and he goes straight outside and you totally believe he's there.

Hang on a second. You were lighting the scene with the front-projected images? Lighting by projection. That's unique.

I think the projection was doing 95 percent of the work.



How did you stitch projection together so it looked seamless?

PRG handled it. They have servers and seaming software. I think at one point they had 10 projectionists and it was a three week install. It was a big deal. We planned this for months in advance and I was drawing and sketching it out. But it was so worth it in the end.

It was also great in editorial. You're not looking at blue screen shots. You're looking at in-camera shots. I remember Tom Cruise saying that he loved being in this environment.

What was the front projection surface?

We had a seamless, painted white muslin, a single piece that was 500 feet by 42, wrapped around 270 degrees.

Where did you shoot this?

This was done in New Orleans. And then we also did some shooting in Iceland as well. The front projection was done in Baton Rouge at Celtic Studios. Everything had to be rigged from the floor because the ceiling wouldn't hold the weight.

The projectors and all the equipment came from PRG?

PRG. Brian Edwards. They were good. PRG did the whole projection thing. They provided all the projectors and were in charge of all the media servers. The background was real-time. What's unique about this job is that it's totally in camera, which is very unusual.

How did you sync these projectors to the camera?

We didn't need to. We just picked a frame rate that worked for the projectors and it was amazing. It seemed that cameras with physical shutters, and I'm not sure why, seemed to work completely, like the F65. Cameras with an electronic shutter didn't work and I really don't know why.

We had the Sony F65 mechanical shutter set to 180 degrees. We never saw any issues. That kind of leaned me toward loving the fact that the F65 has a mechanical shutter.

What influenced your choice of F65 camera for Oblivion?

Originally Joe was wishing for a 4K release of Oblivion but that didn't happen. A lot has to do with finances and time crunch. VFX said that if you need to release in 4K, it's another month and a half of time they would need for rendering and pipeline and checking and all that kind of stuff. It was also a huge additional cost as well and the studio didn't want to go for that, even though Joe was really pushing for that.

Their Oblivion website says shot in 4K.

Shot in 4K. The DI was done in 2K and it is released in 2K. Yes, we shot in 4K. It's all captured in Sony's 4K RAW format. We have the full RAW so I guess with their new de-mosaicing you can now go 8K if you want. It's all a matter of how you de-mosaic the image, but our original intent was 4K.

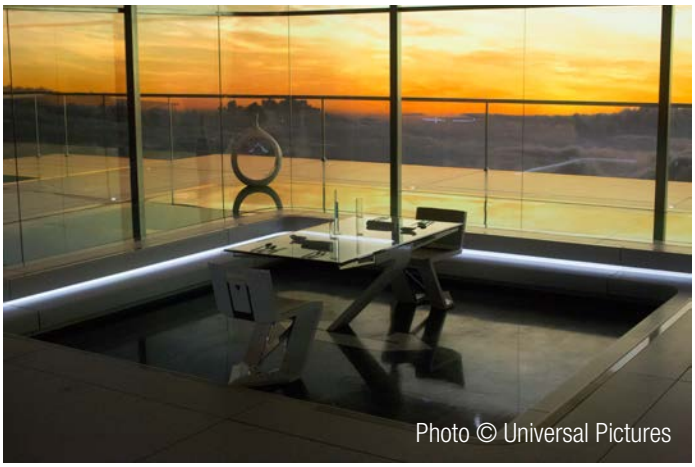
A lot of the VFX work was in 4K for some of the shots, for stabilization, for mattes or plates and sometimes they did work in 4K, but the final render was for speed, I must say the 2K image is very sharp. It's nothing to be sneezed at.

The choice of the camera was originally for 4K. Were there any other factors in terms of the way it worked or looked?

Joe and I liked the way it looked. I think it suited this movie. Some of it is kind of clinical and Joe liked the Sony look on *Tron*. So he said, "Keep it going, let's be on the cutting edge." I shot camera tests. For *Oblivion*, the look of this movie was F65.

Describing a look from cameras and lenses can be almost like describing a wine. What is the particular look of a Sony F65?

It's a little cleaner. It's very resolute and it has a huge color gamut. All these new cameras need to be properly treated. There are certain advantages of Alexa on some shows and of F65 on others. I feel like I really have no allegiance toward any one camera. I just feel like a camera is used for the job.



But not many people feel that way. Some people say you can't pry this or that camera out of their hands. Some people think the F65 is a huge data gobbler. But if your pipeline's ready for it, it's a good big thing. But people have to be a little bit prepared for it. One day I think we shot over 10 terabytes—in one single day. But properly treated, it's really a great camera. There's a huge dynamic range. It has all the things you want. It holds well in the highlights. It gives you a great base for being malleable. You have to know how treat it, how you shoot with it, just like any other camera. I think people are going to be blown away by *Oblivion*. I just finished the DI. It looks great. People come up like Brad Bird, who saw it in post, and he goes, "Wow. It looks amazing."

I think this movie is going to give people good second thoughts about this camera. Our Sky Tower sequences, all done in-camera, look great. Iceland is stunning. That's where we really wanted the 4K for the textures and what we got out of the camera was great: these beautiful exteriors in Iceland that we wanted to capture in full rez and background. When we saw it back in 4K it was stunning.

I imagine there was still value in the fact that you were capturing at a higher resolution and down rezzing. Did it have a different look than something that originates at a lower rez?

Yes. You always have a cleaner image starting from something that's higher. The release of *Oblivion* is going to be in two formats. IMAX is going to go 1.89:1 and theatrical is going to be 2.40.

So on the F65 you just cropped?

For IMAX we protected the 1.89 headroom and cropped the sides because we knew this would be an IMAX release. And for widescreen, we used the side and cropped top and bottom. It was spherical lens format for both.

That leads me back to lenses because you talked about the Fujinon Premiers. Did you use those for the front projection?

No. For the front projection I needed to be at T1.4-2.0 split. I also want to keep the projected background a little bit softer. It worked a little bit better when it was slightly de-focused by having that shallow depth of field. Also I needed the stop. We did all that on Master Primes.

Most of the exteriors and some of interiors, when I could throw light in, were all done on the 4 Fujinon Premiers. They're great lenses. I was shocked. I did not think of Fujinon for filmmaking. I thought of them for sports. They were pretty amazing lenses. They dealt with sun and flares really well. The 14.5-45 T2.0 is, for a zoom, pretty great engineering. I guess maybe it's so sharp because these guys are so used to hitting a 2/3-inch sensor, that when they have to hit a 35mm size sensor, that must be easy for them. I'd be very interested in seeing more lenses from them. I don't know if they'll make primes but their zooms are outstanding.

With the ZEISS Master Primes, I love the 150 mm. That's a freaking awesome lens. I've used them for a bunch of movies and I really love them. They're not quite as sharp but sometimes I'm doing faces and stuff like that and it doesn't need to be so crazy sharp. If I find any little sharpness problems, I'll put the Fujinons on. The Fujinon Premiers are probably comparable to the Leica Summilux-C primes I would say.

Anyway, we had the four Fujinon Premier zoom lenses (14.5-45 T2, 18-85 T2, 24-180 T2.6, 75-400 mm T2.8-3.8) and we had all the Master Primes (12, 14, 16, 18, 21, 25, 27, 32, 35, 40, 50, 65, 75, 100, 135, 150 mm T1.3). I guess when you go to space in the movies you have to go wide angle. It's kind of the law. So there's one scene inside the space cockpit that we used a 12 mm Master Prime. It was a lot of fun. It always makes things look spacey.

Did you use any diffusion or nets or filters on the lenses?

No. I could always do that later. I always feel like I should capture for real and have a continuity for the whole thing because there were certain times when we were doing the ship flying sequences that had to be in blue screen and I could just deal with it in DI. So I shot clean. I'm always going to be at the DI, so if I need to, I can soften it or do something to it. Sometimes, if I need to soften an actress' face, I can do it quickly in DI with an overlay on top.

This is the film every DP has been waiting to see because it's really the first big picture release using the F65 camera.

I hope so. It's a little big and clunky and got a bad rap at first.

What about data wrangling, data management with 4K files? What was the workflow on set and location?

Technicolor gave us their truck with a theater where we could watch dailies, conform for editorial, and do LTO backups as well.

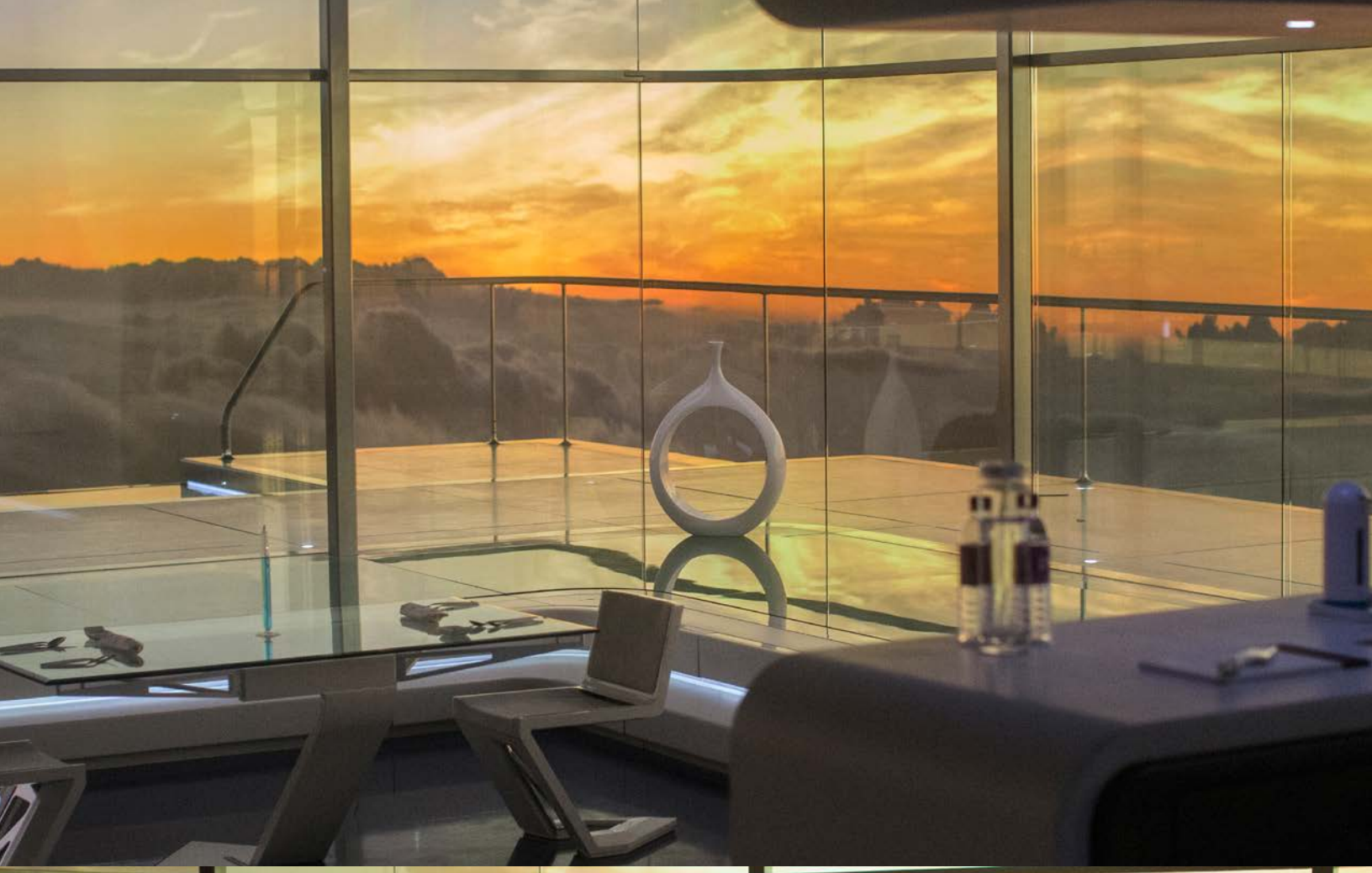
Let's talk about lighting and the style of the film. You mentioned words like clean and science fiction.

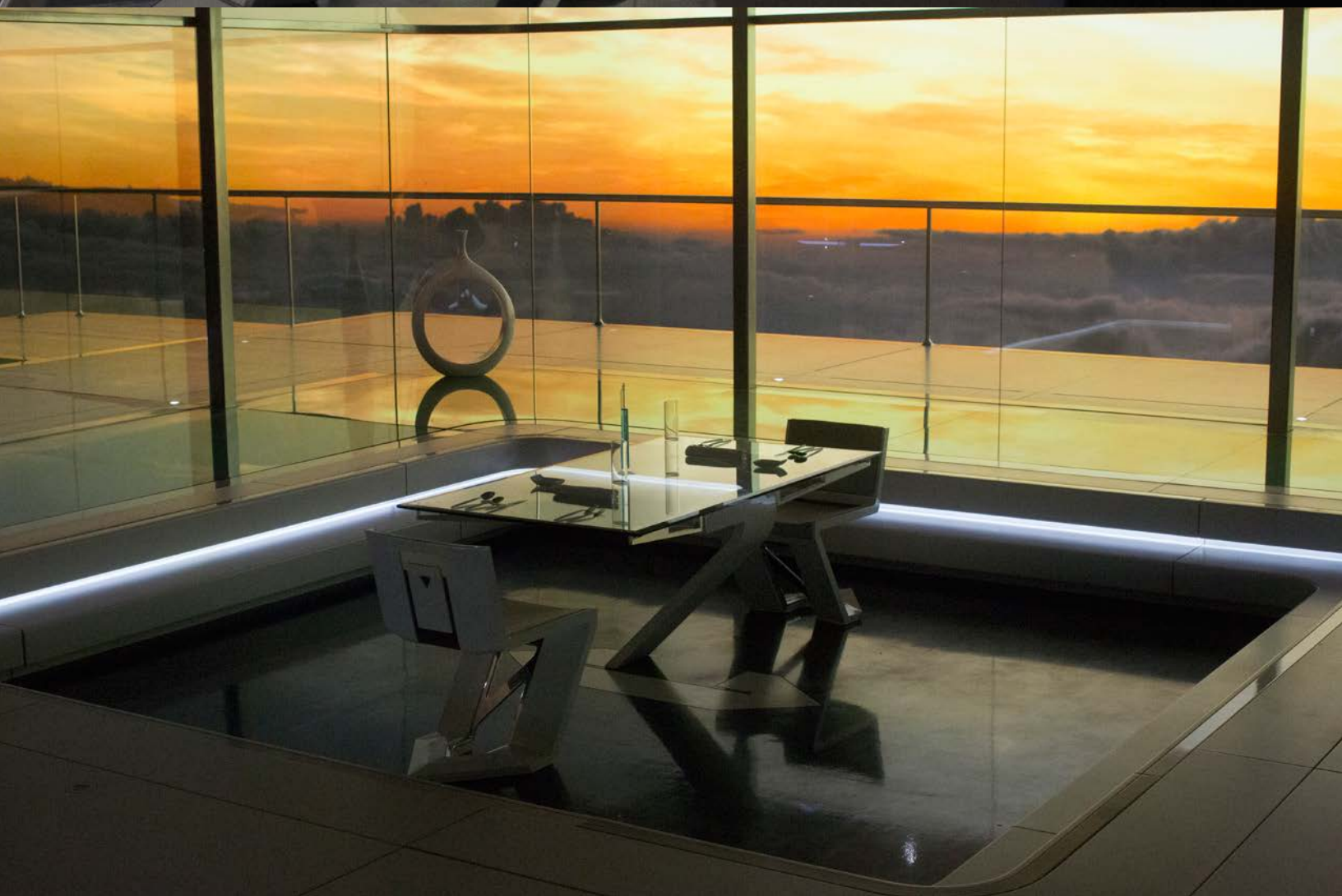
I like lighting from real sources. I don't really like to force it too much. For the sky tower there's a lot of light pushing in through the windows. I'm not really specific on seeing the actor. I just fill in a little bit if I need to. There's one scene where we have a candle scene which is also great for these cameras. We put a candle in the middle and just called it "lit." The one candle was lighting the whole thing. That scene was awesome.

I like to do lighting through windows. We had big windows for this glass tower, so I tried to make all the natural sources feel like it's a real environment, that we weren't singularly lighting people for their marks, let them run through the room and have real interaction. I do love that.

For this big scene with 500 feet of front projection, where did you put the lights if you couldn't hang them?

Sometimes off camera. I would just bounce them on the muslin if I just need a little more push but I really lit it by the projection mostly. I think the projection was doing 95 percent of the homework. Lighting by projection. That was cool.

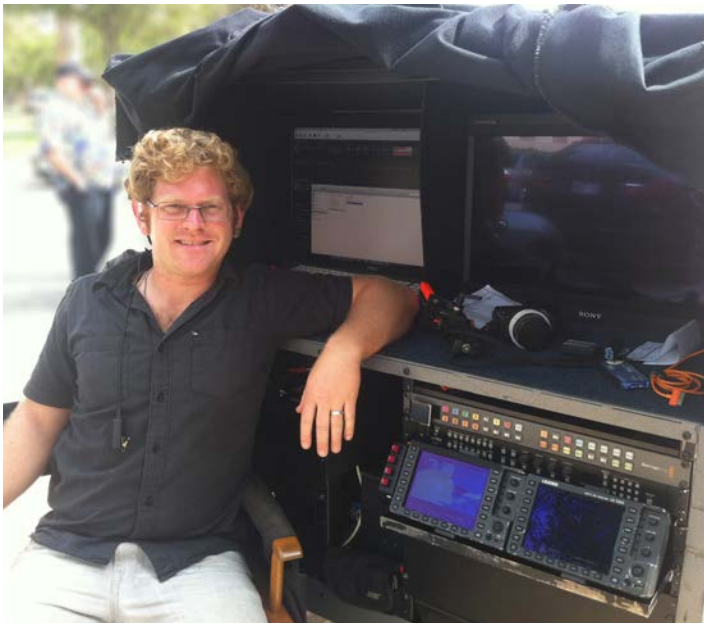




Above and left: Glass House Set on *Oblivion*. Photos Universal Pictures.

On location in Iceland, R-L: Jamie Lagerhausen (Key Grip - Iceland Unit), Claudio Miranda, ASC (DP), Bruce Franklin (AD), Joe Kosinski (Director).

Data on *Oblivion*



Alex Carr, DIT on *Oblivion,* at his station

JON FAUER: Talk about data on *Oblivion*.

ALEX CARR (DIT on *Oblivion*): Technicolor did the data management. We had around 25 Sony SRMemory cards for the F65 at the beginning and ended up with 35. We would give them the cards and they would have LTOs written overnight, or within 24 hours. They would give us the cards back once the backups were done.

Surprisingly we would shoot 3 to 5 terabytes a day sometimes. But they could barely keep up with the data backup to LTO. Cloning the data files was not a problem. The bottleneck was LTO because of the amount of data. But the answer was simple. We just got more SRMemory cards.

Which cards did you use?

We used mostly the 512 GB cards and a few 1 TB cards for the really long dialog scenes.

How did you manage data on location?

Technicolor had a little trailer with a dailies projector near the set. Their assistants would come and take our "exposed" cards and then return them once they'd been cleared. They were very close to the set except on a few locations in Iceland. One location was 10 hours away from Reykjavik. That's an hour and a-half flight. I downloaded everything to my RAID on set before I'd send it in by helicopter. The producers felt a little leery about sending the only copy all the way across the country.

What did you have on set in the way of hardware?

I didn't need a lot of horsepower so I just had a Quad-Core PC with a 16 terabyte RAID. My system was set up to capture some segments from each setup to provide lighting references and for matching later on.

I would capture some takes to reference lighting setups—grabbing an average of two takes. I would also download. I had a Sony SR-PC4 Memory Data Transfer Unit which has a reader for the F65 cards. I would download some of the RAW files occasionally to check.

When it was time to reload, the second AC pulled the card out of the on-board recorder, wrote the roll number on the card, and gave me the card and the camera reports. I'd check that everything was on the card. I always checked through all the files.

If somebody wanted to look at the RAW files from my system I could use my Blackmagic hardware to ingest and then output onto the Sony 25-inch OLED BVM-F250 Monitors. We had four of these Sony monitors on set. Claudio had one, I had one, and the director had two. They are excellent monitors.

What software did you use to check the data?

The PC4 has a web interface. You can use any web browser on an operating system to be able to check the files. You just type in the IP address of the card reader in your Firefox and it comes right up. Then you'd see all the clips and you can play back clips directly from the PC4.

If I wanted to make sure we had something I just played it back right away. Then Technicolor would come and sign out particular cards, so that we knew that they had them. When they cleared the cards they'd bring them back and sign them back in.

Did Technicolor use a PC4 as well?

Yes. They used a PC4 with a 10 gigabit Ethernet setup. They had a large SAN: I think their main one was 128 and the backup was 64 to 100 terabytes. They could download in close to real time.

What would always take the most amount of time was writing the LTO tapes. We were not allowed to clear the cards until the tapes were verified. LTO speed is about 300 MB a second. If we shot 3 TB, that would be an an overnight turnaround to backup to LTO. It's the LTO that causes the bottleneck, not the file writing. Basically it takes 6 hours to write to a 1.5 terabyte tape and verify it. That's 3 hours to write, 3 hours to verify for an hour and a half of material. So 3 terabytes would be 2 tapes. That would take 12 hours.

Technicolor had a Colorfront setup in the trailer. They would make any corrections for dailies, which were screened every day around lunch time. And they would also make Avid media files as well.

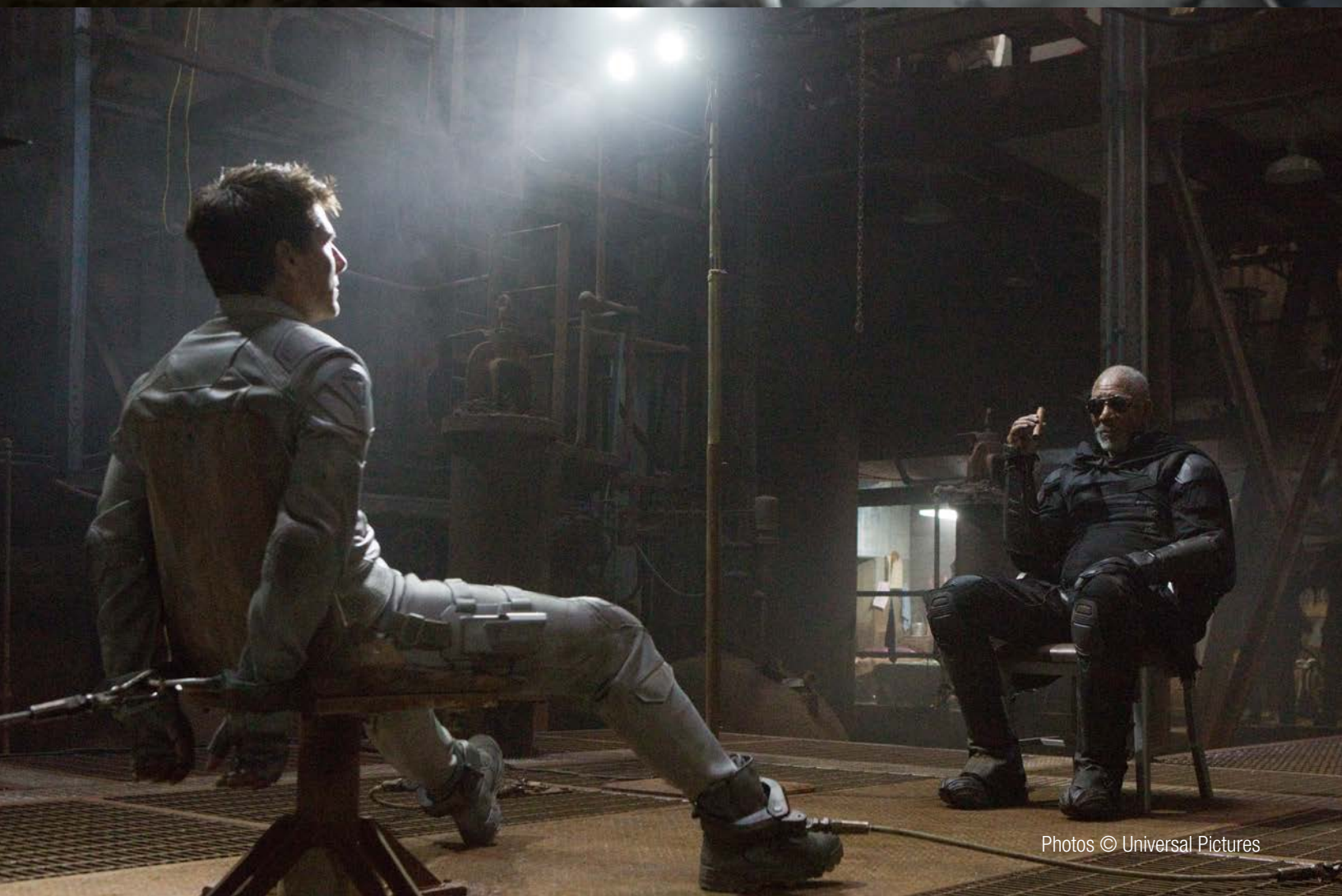
You captured everything in 4K? How did you see it on set?

We were looking at the S-Log2 look-up table. The whole show was shot on Sony F65 in 8K. We used some RED Epics at 5K. The RED cameras were for used for lightweight Steadicam, camera rigs and mounts. We had a spaceship and they could mount the little EPIC camera anywhere they needed to.

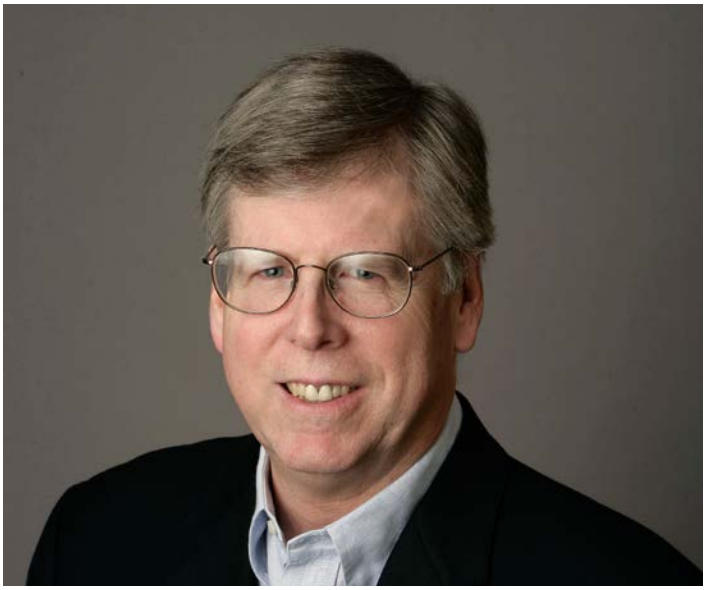
Some productions have been reluctant to use the F65 because they've been scared off by the workflow. But from what you're saying, it doesn't sound tough at all.

No, other than the amount of data, everything else is very easy. In DaVinci it was like any other job. The F65 renders jobs much faster than real time. And you don't need a special card.

If you have the right setup, F65 is not a problem. With a 512 GB card, it would only take a half an hour to download over 10 gigabit Ethernet to a RAID. And it would only take about 25 minutes to render to an offline format. Actually less. If I'm rendering to an Avid or ProRes for offline with a color correction, then it's mostly double real time. There were no issues or problems and I actually prefer the F65 over most other camera systems at the moment.



Chris Cookson on 4K and More



Chris Cookson is President of Sony Pictures Technologies. We spoke with him at Colorworks during the F5/F55 launch at Sony Pictures on November 28, 2012 and then by telephone. As President of Sony Pictures Technologies, Cookson oversees the development and implementation of the studio's technology policy and processes. His team leads the studio's effort to educate and implement new technology, including the transition to 4K, UltraViolet and digital distribution, 3D and digital file-based workflows in the making of entertainment at Sony Pictures and beyond.

We initially spoke at the launch of the F65 when it was first going onto *After Earth*. And then at the launch of the F55 and F5, we discussed doing an article on 4K.

We've been working on 4K for many years. The reason we started doing 4K was that when you look critically at what we've been shooting in 35mm and 65mm film for the last 100 years, the print that you saw in the theater represented a fairly substantial degradation from what the negative had on it.

You started with a negative and from it make it an inter-positive followed in turn by an inter-negative and from that you make a print. There are fairly significant losses in information from each one of those generations. When you look at what was on the negative, and you wanted to preserve everything that was captured, you really have to work in something more than 2K. It's really pretty logical when you look at it historically.

HDTV, which is essentially 2K, was developed about 35 years ago with the purpose of trying to replicate the experience of sitting in a theater and watching a print. Think about the degradation that happens in making that print—and think about taking that print and putting it in a mechanical projector, which typically wanders a bit from one frame to the next.

So the picture that's being presented is what we all accept as a theatrical release print but is not really a reflection of what's on the negative. When we started talking about doing digital post production for material that was shot on film, some of us felt very strongly that if we were going to argue that we were putting as much information into the vault as we did when we simply cut the negative, we were going to have to work at more than 2K because 2K is only what you can see on today's film projectors. It's not what's on the negative.

It's interesting that in the 100 and more years of film production, we never were in a situation where the only thing we put into the vault was what we were able to project that day. Restoration that's gone on over the years proves the wisdom of going back to the negative if you think about what you used to watch on television years ago—it was a 16mm print. It was shipped to the TV station and they stuck it up on a Vidicon film chain and there it was and that's what we watched at home. When commercial VHS came out, what we saw was only as good as the VHS tape. With Laserdiscs, you also lost information to make room for the color because it was an NTSC composite. When DVD came out, DVD represented a substantial improvement because it didn't have the color limitations. You had a full SD resolution image.

Presentation was limited by our ability to ship it and display it. When HD started to come out, the first HD was actually mastered on HDCAM at resolutions less than 1920x1080 and that didn't matter because the first generation of HD TV sets were not capable of showing 1920x1080.

When the first 1920x1080 sets finally arrived, suddenly we realized that the pictures we'd been shipping around weren't as good as they could be. So we had to go back and master things again. Fortunately, the negative had all the information that you needed, and the picture could come up to the current state of the art. Now that 4K is coming, one of the things you can do is go back to the negative and find that there's actually significantly more information on the negative than there was on the HD master.

These 4K pictures will look good when you put them up to the next generation of displays. That's one way of looking at 4K. It's about protecting the value of the library by trying to future-proof the post production process in a way that maintains everything you shot. Unfortunately, a lot of the stuff today is being shot on high-def television cameras and they will look like high-def television shows 20 years from now.

I remember Rob Hummel saying that you can "mine" a negative and get more than 4K out of it. Why do some people say you can't see the difference with a 4K camera?

If they can't see the difference, it's only because of the venue or location where they are viewing it. If you sit in the middle of a stadium seating house, typically, you're about 1½ to 2 screen heights away from that screen. If you do the math on what 20/20 vision means, you find that the smallest detail you could see if you have 20/20 vision is too small for 2K.

I'm sure that you've experienced graphics of the titles, diagonals, or straight lines in the picture that became jagged.

That's because the picture is made up of squares. If your eye can distinguish those squares, it takes you out of the movie by giving you kind of a look through a screen door. If you are sitting in the middle of a modern stadium seating theater and you think about the detail that 20/20 vision can see, you realize that the resolution you need on the screen of that theater is 4K.

When people say they can't see the difference, it's because they weren't really looking from the right place. It's funny. Some people say they would have to get a larger living room to see the difference

with a 4K set. That's exactly the wrong answer. Think about it this way. Once upon a time, you probably had a 20 or a 25 inch standard definition television and you typically sat 8 to 10 feet away from it. That was about 6-7 screen heights.

A few years later, when you got your 46 or 50 inch HDTV, you didn't tear a wall out, you just took the old Standard Def TV set out and put the bigger HDTV screen in the same place and you watched it from the same chair. It wasn't that the pixels were necessarily smaller. The pixels could have been the same size. There were just more of them.

If you get one of the new 84 inch 4K TV sets, it's not about putting your chair 12 feet back or 15 feet back. It's about leaving your chair exactly where it was and looking at the greater resolution that comes with having four times as many pixels as your HD set had. But the pixels are the same size as they always were—about the same as your 46 inch HD set. The pixels are similar in size, but there are more of them.

What are the ideal viewing distances?

For 4K, you want to be one and a half screen heights away. Which was thought of as the ideal spot in a movie theater. In a stadium seating theater, that puts you just about smack dab in the middle of the house. An NTSC TV was often viewed at seven screen heights away, a distance where you probably wouldn't be able to tell the difference between a DVD, a Blu-ray, or 4K.

After CES, some critics said they couldn't see the benefits of 4K.

There are two things to consider about 4K. One is trying to preserve as much information in the vault for the future as the market continues to evolve. And the other is that the theater today has evolved to where I can sit close enough to the screen that the picture more or less fills my field of view. That's too close for 2K; I will see the structure of the picture and it will have the effect of looking through a screen door. That's why I want 4K for viewing.

Theatrical or 4K TV: what's the difference for Sony? How do you get people out of the living room and back into the theaters?

We want to make sure that everybody finds a way to watch a movie that is enjoyable and convenient for them. The theater has a lot going for it in creating a great experience. Since the invention of the TV, home presentation has also tried its best to mimic the theater.

Where does that leave us if 8K is on the horizon?

If the picture fills my field of view, and I have 20/20 vision, my eye is well matched to that picture at 4K. If the picture extends twice as far out, wider than my field of view, then I would like to see 8K. You have to be three quarters of a picture height away, with 20/20 vision, to really appreciate the difference between 4K and 8K.

Can you give us a quick rundown on a typical workflow coming out of the F65? Is it treated the way a negative would be?

It's funny you say that because people developed a lot of habits when they went from film to video, because video, to be honest, had a much narrower dynamic range. When you were shooting film, a qualified cinematographer knew how to expose. They knew, when they lit, what it would look like. And they knew they had the ability to tweak it in post because there was so much dynamic range and because the characteristic of the film was to have a knee and a toe that would mean that you didn't clip things out.

You could adjust things later. But television didn't do that. When we started using television cameras, they had to be exposed pretty much right on and people were very concerned about color. Engineers were put on the cameras to make sure that they were operating within their parameters. You had to nail it when you shot it because you weren't going to fix a lot later.

It really was a way of dealing with the fact that the television camera was a much more limited device than 35mm film. Today, with the F65, the dynamic range of the camera is as good or better than film. If you shot film and were confident that you had what you needed to deal with it in post, you could shoot the F65 the same way. It's interesting that we've matured electronically to the point where the methods we used creatively when we were shooting film now work for us digitally. Then there's the question of do you need dailies? When you shoot with film, you know you're not going to see it until tomorrow, no matter what. If you're comfortable, if you know what you're doing, you can use what is the equivalent of the video tap. That's the HD output. It lets you judge performance and see everything you need from the actors and the situation. The actual "negative," if you will, isn't as important to see at that point. You can see it later.

Can you give us a workflow example from a TV series?

The workflow is you take the Memory Card out of the camera and download it. You make a proxy which goes into the editing process. The RAW data goes into our digital backbone (storage). It sits there and waits until you're ready to conform. End of story.

How do you ingest it? What's the physical hardware?

It depends. If you're on location, you'll probably ingest it into a smaller server and lay it off from that onto LTO tape and ship that. In some cases, if you choose, you can just ship the data pack, the actual Memory Card. When we built Sony Pictures Colorworks, we designed it from the ground up to do 4K. It uses fiber channel and the infrastructure moves data at the rates necessary to do 4K.

If your infrastructure was built around doing HD TV, you're going have to change some things because you have more data. But if you design it from the ground up to do 4K, then certainly the labor and most of the rest of the things that go into the production process are the same as they would be in 2K.

It's interesting because, as you started off by saying, a lot of people say we don't need 4K. There were a lot more people saying that 10 years ago when we started doing this. But I think more and more people are recognizing that if the projects that we think of as our crown jewels are going to have the greatest value over the longest time, they need to be able to be dressed up to be viewed on new display systems that haven't really been released yet.

You spend a great deal of money to make a motion picture and to throw away a bunch of information at the beginning of the process just seems to me to be short-sighted.

If I were an Executive Producer or Studio Head of Production reading this, I would be terrified if I weren't shooting in 4K.

Well, I did a speech a few years ago at a conference and referred to this period we are now emerging from as the dark ages. Almost everything shot before this, on film, will look a good deal better in years to come than stuff that was shot on video in the last five years.

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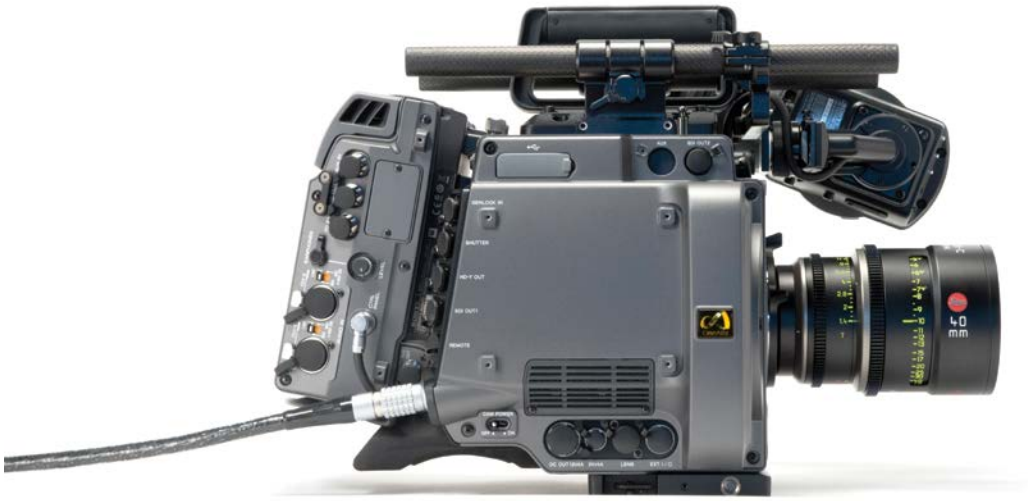

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