



COMIN' AT YA! ICG EXAMINES THE LEARNING CURVE FOR SHOOTING HD 3-D

By Pauline Rogers

Early last year ICG National President Steven Poster, ASC had the opportunity to have lunch with director James Cameron, who showed him a sample of his experimentation with 3-D just before going into production on his project.

This isn't the first time Poster has learned about the move into HD-3D production. He had also met with Vince Pace (Pace HD), Steve Schklair (3ality). Over the years, he'd kept up

with 3-D veteran cinematographer Peter Anderson's work.

"I realized that this train is coming right down the tracks at us," says Poster. "3-D is such a complex issue for every classification in Local 600 that we had to start researching the possibility of training programs for our members. Now almost a year later, we are that much closer to the reality of the resurgence of this exciting medium. The new technologies of

multi-dimensional presentation are far more complex than just shooting standard two dimension formats.

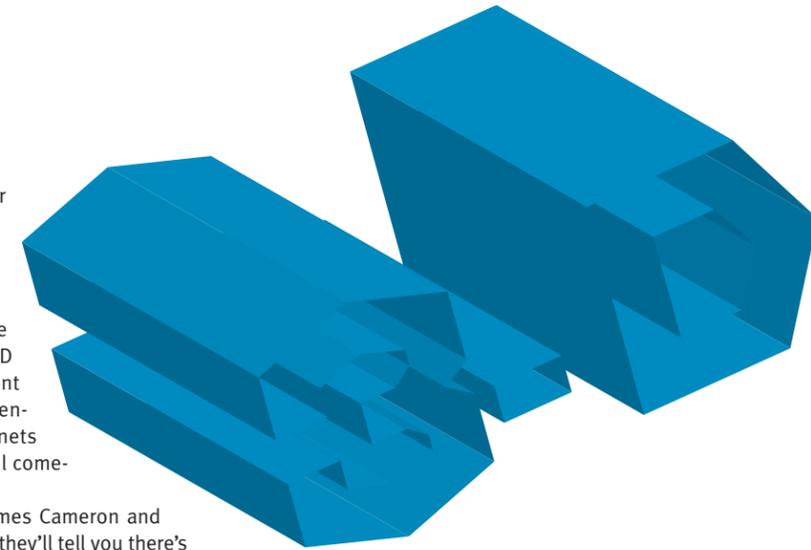
"Our training committee has been working very hard to create intensive program sessions to give our members the tools to understand the issues presented in this article and I'm very excited about the possibilities of our members becoming the leaders in this new generation of the third dimension."

Talk to cinematographer 3-D guru Peter Anderson, ASC, who has been working with this format for close to 25 years and he'll say the only real change in HD might be the content being shot. Soon adventures on different planets will give way to physical comedies and love stories.

Talk to director James Cameron and partner Vince Pace, and they'll tell you there's a new revolution in cameras, in shooting, in today's work—and in the future.

Pick up magazine after magazine and each one will have something about HD 3-D. The articles will wax-on about a new revolution in filmmaking. What they don't talk about is what the behind-the-scenes people need to know to get the production to the screen. There is a lot to be learned to successfully put an audience in the middle of a U2 3-D concert, the life of *Hannah Montana/Miley Cyrus: Best of Both Worlds Tour*, or to experience Robert Zemeckis' *Beowulf*, *Journey 3-D*, James Cameron's *Avatar* and, well, the list is growing.

All the audience has to do is put on the improved 3-D glasses and they are in the middle of the experience. Camera people have to experience a whole new learning curve before they can bring digital 3-D to the screen.



CAMERAS AND RIGS

The simplistic approach is to say that each camera system consists of two cameras; one recording left-eye images and the second right-eye images. To create 3-D, both images must be recorded simultaneously and eventually projected at the same time. To do this, the lens, lens' mounts and optical head block become a smaller unit. These units are connected to their "mother" camera by an umbilical cord and their information signal conveyed to the DIT.

Although every company from PACE Technologies (working with James Cameron) to

3ality, Max Penner's Paradise, Cerner Optics, and others have their own variations, there really are only two types of platforms or rigs. The beam splitter uses a 50/50 mirror and the advantage is in the math needed to maintain the 3-D image. In addition, a beam splitter can narrow the interocular when needed to as small as 1/2" or 3/4", by throwing the convergence deep, which can't be achieved with a side-by-side 3-D system. The side-by-side can also carry longer lenses. These cameras are also lighter and smaller.

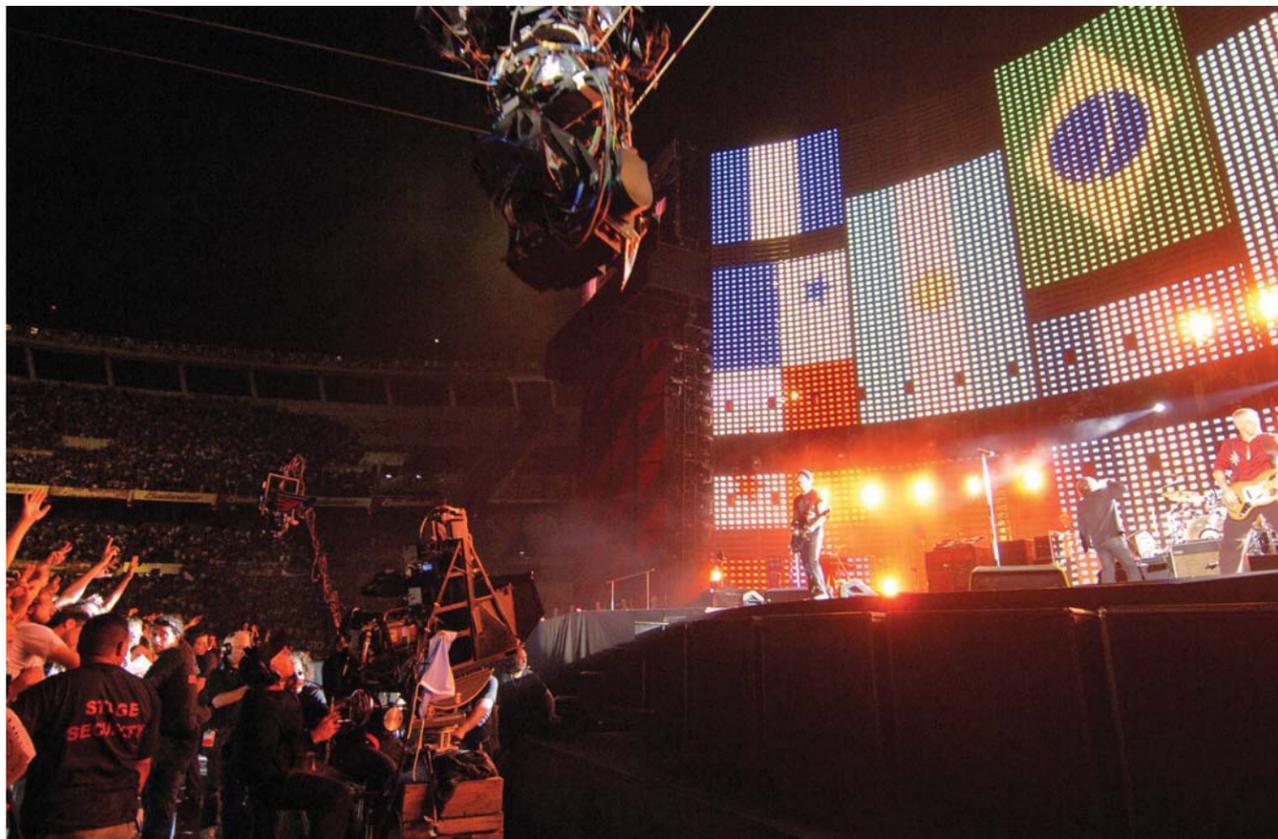


Photo courtesy of Jaiily Digital Entertainment

FOR THE CINEMATOGRAPHER

Perhaps the best way to describe the cinematographer's challenge in 3-D is that he or she needs to "enhance" their creativity. Creating depth is first and foremost. "This can be done with composition as well as lighting," explains

cinematographer Tom Krueger, as he recalls some of

working on U2 3D. "3-D composition works best when careful attention is paid to stacking objects in the foreground as well as background. The movement of the camera creates a shifting plane between objects, which will enhance the depth even more. So, bring on the Technocrane, helicopter, or any of those wonderful tools that move a camera."

Framing becomes even more acute. A foreground object sitting on the edge of the frame is disconcerting. One "eye" will see it while the other "eye" will not. "It's sort of like having a 3-D blind spot," says Krueger.

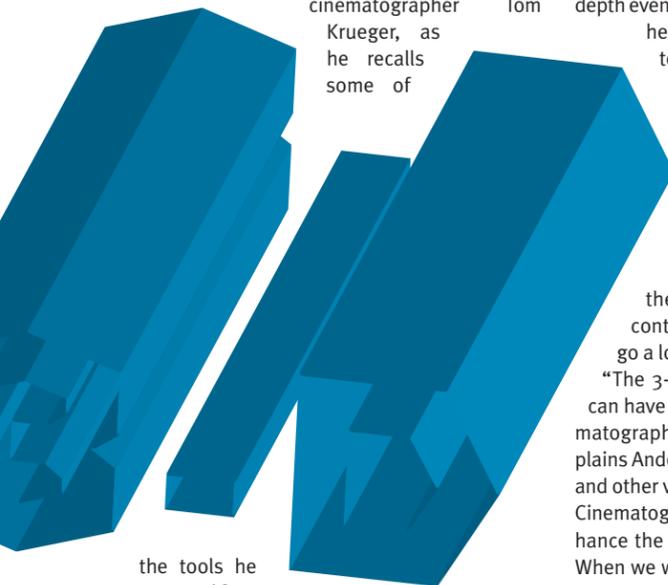
As for lighting, depth enhances the 3-D effect. Back light, modeling, contrast, color-contrast and separation go a long way to enhance the experience. "The 3-D viewing system ultimately used can have an impact on the product and cinematographers need to be aware of that," explains Anderson. "Polarization, a silver screen, and other variants must be taken into account. Cinematographers tend to light deep and enhance the effect to minimize the differences. When we were doing U2 3D, it would be a big joke that we tripled the atmosphere smoke. But it softened the light, worked the atmos-

phere, and was great for 3-D depth cues."

Cinematographers also have to take into account the screens, which play into even more contrast. "It is best to light a set for what you want to see on the screen, not what looks good on the set," says Anderson. "A beam splitter rig loses one stop because half of the light goes to one and half to the other. You need double the light level to get the same depth-of-field or increase it even more to add more depth-of-field."

In addition, lighting for depth-of-field will enhance the 3-D experience, which means additional lighting requirements at different times. And, because of technical limitations, many of the current 3-D digital cinema theatres are projecting much less light on to the theater screens than we are used to in the 2-D theatres. It's a consideration to keep in mind when lighting, exposing and filming theatrical 3-D productions.

"One of the greatest movies ever made that uses most of the 3-D spatial visual cues is *Citizen Kane*, which was not shot in 3-D," reveals Anderson. "Think about how Gregg Toland (ASC) used those beautiful sets. He lit them so wonderfully. You could see them for miles. They were playing with the mind, sometimes going shallow and sometimes deep. What a perfect venue for the 3-D tool set."



the tools he garnered from Peter Anderson, ASC, while

FOR THE CAMERA OPERATOR

The 3-D camera system is little bigger than a standard camera and has a few more parts. It also might have a little more head and yoke but with a little extra effort, you can still place it almost anywhere you can place a conventional camera.

However, there are a few things that an operator has to be more aware of such as what is in the frame and what is breaking the edge of the frame. Spilling the frame edge becomes a visual distraction that takes the audience out of the 3-D experience.

Perhaps more important to an operator is the involvement in making sure things are stacked properly. What's off the screen plane and what is deep must be in a pleasing relationship. An operator can't think of what is in the viewfinder is pleasing in 2-D and let it go. What the second camera sees might not be as favorable and the illusion is shattered.

Camera operators often work harder in this medium, because the shots are longer and more complicated to allow the 3-D

world to spatially play out in front of the camera (more dollies, more cranes, pan, tilt, more marks to hit, etc.).

Operators need to be more involved when something isn't quite right. When an actor doesn't quite hit a mark, when a dolly didn't hit that mark, when things aren't stacked quite right—they need to have more control. Sometimes, that means rectifying it with a pan or tilt or a conversation with the dolly operator, while other times, everyone gets involved.



Photo courtesy of Pace



FOR THE ASSISTANT

Probably the most involved and difficult part of a 3-D shoot is the crucial work of the assistant. It starts in the prep. Not only do the assistants have to prep each camera and lens to work together, they also have to prep two "sets" to work exactly, not match like 2-D, but work exactly together. They have to work together in sync and capture identical images.

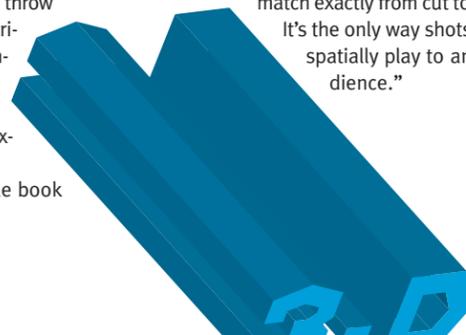
A pixel off is painful to the viewer and has an impact on the 3-D matte. If the pixels are off vertically, that can't be corrected. If they are off laterally, it's painful but a 3-D

matte can compensate. Prep just became a lot harder.

There is a whole new mind-set needed to pull focus for 3-D. It's often a creative and judgment call. Sometimes, an assistant can throw the focus differently, to make the experience feel different or more like a dimension. By looking at one point and then another, then slowing down the pull just a little, it not only compensates for the experience, it enhances it.

And, if that isn't enough, a whole book

can be written on the math of capturing 3-D. Everyone has to know and understand it. "3-D has to be exact," insists Anderson. "It is about building a series of shots together that can match exactly from cut to cut. It's the only way shots can spatially play to an audience."



FOR THE DIT

As with the assistant, the DIT needs to know that every rig has two cameras, two lenses, and often a beam splitter, and everything has to look identical, which is often not a simple task. It takes finesse.

Then, of course, there is matching of focal lengths, lens distortion, color space, not to

mention the other rigs that are in play.

A DIT has to make sure that, as shots are cut between multiple 3-D systems and over many setups, the audience will get the same experience.

"Most digital cameras have a tendency to lose detail on the highlights," explains Anderson. "That's one of the things that we don't

want in 3-D, with the high gain screens and left to right images. This is probably the biggest thing on the set for the DIT—keeping the color space of the camera so it records the highest dynamic range possible without loss of detail in the highlights and not too much noise in the shadows."

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Forget what it takes to make a theatre digital. It's happening with or without the 3-D technology. However, add the 3-D technology and you have an interesting curve. It's the projection package, server to feed content, screen and glasses that makes the difference.

Real D, the current leaders in adapting venues to the 3-D world, has found that using a silver screen customized to maximize both the 3-D and 2-D viewing experience is crisper and delivers brighter images. It also increases light availability and saves power.

"The brighter is very important in screen and projection," says Joshua Greer, co-founder of Real D. "From a production standpoint, 3-D

capture eats about three stops. What is projected at 14-foot lamberts in 2-D is between four and five in 3-D. What gets to the eyeball after it hits the screen is different."

Getting the image to the screen is also different. "With the old system, you used to need two projectors, one for each eye," explains Greer. "In the 35mm world, alignment was the big challenge. Now, when Real D goes in and sets up 3-D for a theater, it's a single projector that delivers content at a frame rate best for the image."

And, how about those glasses? Each company may have a slightly different version of glasses, however, the technology is far bet-

ter than those paper things that never stay on your face and, if you move the slightest, destroy the experience.

Real D's polarized lenses, for example, depend on circular color instead of linear, which means the viewer doesn't have to hold his/her head perfectly still—a 35% tilt still keeps the audience in the experience. Pick one up going in, it will fit over your glasses, watch the movie and return it to be cleaned and ready for the next viewer. Although, according to Vince Pace, and a few more enthusiasts, 3-D will become so popular in the next five years, people will be able to go to their optometrists and order their own prescription that is already fitted for 3-D.

THE FUTURE

What is important to understand is that a 3-D project is a visceral experience. When someone leaves that big screen television and all the gadgets available for a 3-D theatre, they are walking into a personal experience with the images on the screen. It is no longer about what other members of the audience see; it is about what each individual experiences with the "characters" on screen.

"3-D can move people like nothing else," says Anderson. "While we were doing *U2-3-D*, we did a sequence with Bono singing 'One.' The camera wasn't moving and Bono, who was extremely savvy about how to perform in 3-D, was seated. Yet, during that one piece I changed the 3-D rigs math's settings around 80 times. Bono just moved his hands, his head, and his body. As he became more passionate in his singing, I expanded the 3-

D experience, matching his passion. As his passion calmed down at the end of his song, we came back into the normal 3-D world. Unfortunately, this shot did not make it into the show.

"This is exactly what filmmakers are working to get with a 3-D project—a way to involve each individual in an emotion that can not be experienced with such reality in a 2-D theater or at home in front of the big screen." 🎬

Editor's Note: ICG Magazine would like to thank 3-D guru Peter Anderson, ASC technological wizard Vince Pace, Pace head engineer Ryan Sheridan, 3ality's founder

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