

millimeter

August 1, 2000

What Lies Beneath - Virtual Realism

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“WHAT WOULD ALFRED HITCHCOCK HAVE DONE IF HE'D HAD A COMPUTER?”

Visual-effects supervisor Robert Legato poses the question to express the aesthetic behind *What Lies Beneath*, director Robert Zemeckis' suspense film for DreamWorks. Legato, the Oscar-winning supervisor of *Titanic*, says that the filmmakers did not want to “quote” Hitchcock or show off. Yet, he says that as in Hitchcock films, viewers are transported at every moment to exactly where they need to be to observe the action. “Today, you can design any shot that tells your story best without fear that mechanically you won't be able to get it,” Legato notes. Robert Zemeckis did just that, designing long, complex camera moves that would be impossible to achieve on set. Though most viewers might not notice-absorbed instead by the relationship between Harrison Ford and Michelle Pfeiffer-the film pros in the audience will often wonder “How'd they get THAT shot?”

A 20-second sequence in which Michelle Pfeiffer's character flees her house one ominous night exemplifies such a complex move. Pfeiffer runs out, gets into a car, and anxiously realizes that her keys don't fit the ignition. The challenge was to get from a long shot of the house's exterior to a view of the steering column from inside the car-without a single cut. “Bob wanted to get from one point to the next as if we had a little lipstick camera with no apparatus behind it that we could place anywhere we wanted,” says Legato. “Only if you know how to photograph things would you know that it's physically impossible to get this shot.”

Working with his digital-effects team at Culver City, California-based Sony Pictures Imageworks, Legato decided to create a CG car. This virtual car eventually would replace the rig that Pfeiffer would be filmed climbing into on set. That bare-bones rig-which had no windows or exterior panels would allow DP Don Burgess to move the camera from outside to inside in one continuous shot. Legato notes that such a rig, called a buckshot, is commonly used in car-advertising for shots featuring just the car's interior.

“As the camera starts out, we're looking toward the front windshield and the passenger-side window from 30 feet away,” explains Legato. “The camera is veering toward the passenger window as Michelle runs from the house. We then move into the car through the passenger window, showing the whole inside of the car including the dashboard. When Michelle gets in we start panning onto her, so we momentarily lose the view of the dashboard. At that moment, two guys are yanking the dashboard away to allow the camera, which is huge, to get this very smooth move. The buck doesn't have any roof to it, so the camera can move freely. It ends up underneath where the dashboard used to be, looking up past the ignition key to Michelle Pfeiffer's face.”

Watching this with Legato was Imageworks' digital-effects supervisor Richard Kidd, whose team eventually would be covering up the buckshot with the CG car. Since the camera was constantly moving, Kidd had to make sure that various elements in the shot were measured precisely so that he could later track the CG car seamlessly into the shot.

“We brought in a team that used a laser to survey identifiable points on the house that we could track, like the corners of windows,” explains Kidd. “We also put laser tracking markers on the buck to indicate where the car door was ultimately going to be put and where the slant of the windshield would be.” The laser pointers on the buck also helped the first-unit crew see the space that they had to maneuver the camera through. The crew had to move it above the line that indicated the passenger window and around what would have been the pillar of the door-as if they were really shooting the car.

Kidd notes that his team did not want to put too many tracking markers in the scene that could not be covered up later. “Erasing them would have been difficult because this is a foggy night-time shot, and there was a lot of particulate detail that we’d have to paint through. That gets smeary-and obvious-really fast.” Armed with the plate shot and reference material, Kidd’s team began building the CG car into the shot. Viewpoint, the database company from Draper, Utah, did not have a model of the brand-new Volvo used in the shot, so Imageworks had Viewpoint digitize the actual car. To make the digital car appear real, notes Legato, “we created dirt marks on the tires and reflections in the windshield and lit it to look like it was in that environment.”

Kidd’s team used Side Effects’ Houdini for the car and Pixar’s RenderMan to create shaders that showed the environment reflected on the car. While filmmakers had shot an actual Volvo on set for lighting reference, the team couldn’t use any of the reflections of the film set and had to paint in reflections of trees. Crucial to the shot’s believability was tracking the CG car within the scene. John Willette at Travelling Pictures in Detroit, Michigan, handled this task. “John used [Hammerhead Productions’] ras_track software to track the survey points like the corners of the house in 2D,” says Kidd. “Once he had those tracked, he converted them into 3D using 3D Equalizer [from 3-D fx]. That camera move worked straightforward for us.” Imageworks composited the CG car into the shot using proprietary software called Bonsai and cleaned up extraneous details using Discreet Inferno and Flame.

“Assuming we did well enough, audiences won’t question that it’s really a car,” Legato concludes. “When you look at this all put together, it looks like we could really shoot it!”