

Out of the Blue (Screen): Production on *Sky Captain*

By Matt Hurwitz

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For five weeks in late 2002, everyone at London's Elstree Studios was seeing blue. The world the crew and actors were to inhabit existed, for the most part, only in the mind of filmmaker Kerry Conran.

The first-time director's landmark fantasy adventure, *Sky Captain and the World of Tomorrow* (Paramount), released this month, combines live action people with computer-generated backgrounds, as well as the occasional giant robot. Based in 1930s New York, the film follows the heroic Sky Captain (Jude Law) and his crew, who are pursued by reporter Polly Perkins (Gwyneth Paltrow) as they battle the evil Dr. Totenkopf (portrayed by Laurence Olivier, courtesy of some 1940s BBC footage).



**Gwyneth Paltrow and Jude Law
in 'Sky Captain'**

Conran actually began the project 10 years ago, after graduating from the Film Department at Southern California's **California Institute of the Arts** (CalArts), perhaps best known for its animation department. "I was in the live-action program, but I spent most of my time with the animators," Conran

says. "When I left school, I began working on this project, to see if I had a viable approach."

From the beginning, Conran's approach was to film live-action characters on bluescreen video and combine them with completely computer-generated backgrounds composed of 2D photographs. "The video and computer equipment were quite crude by today's standards. I actually looked at medical imaging equipment and robotics inspection cameras, because they were the only things that were progressively scanned."

Conran spent the following four years putting together a six-minute black-and-white test film-which represents essentially the first 10 minutes of the complete feature. "He shot it with this 'new format,' called 6mm, which, of course, became Mini DV," says Cinematographer Eric Adkins, under whom Conran studied at CalArts. The director eventually acquired an early version of **Adobe After Effects** software, which he used to combine the live-action images with a selection of historic photographs he had assembled into convincing backgrounds. "I had experimented in college with the idea of turning the computer into an animation stand or optical printer, but using live action instead of cel animation."

The finished short was proof that a film could be made in this manner. Six years ago the short made its way to producer Jon Avnet via fellow producer Marsha Oglesby. "Kerry's visual story was so remarkable to me," says Avnet. "His framing and his use of light really interested me. It was the first time I'd seen anything that was supposed to be high def look like film." Avnet agreed to produce the project, using his own money, bringing on a studio for backing and distribution only after production had begun.

Conran spent the next two years developing the script, "with me hanging around his neck," notes Avnet, "because I thought we had something that was pretty good, and I could get some good actors for it." Avnet eventually secured the interest of Jude Law, who became one of the film's producers, and actresses Gwyneth Paltrow and Angelina Jolie. "I knew Kerry hadn't had much experience working with actors, so I wanted experienced actors-particularly stage actors-since shooting this film would be more like a theatrical experience than a movie."

By 2000, Conran began preliminary design work, bringing in his brother, Kevin, an accomplished illustrator who eventually became the film's production designer. The film's look draws heavily from the art deco world of 1930s architecture, as well as the work of German expressionist filmmakers such as Fritz Lang (*Metropolis*) and F.W. Murnau, and American comic books and animation. Of the latter, Conran referenced Max Fleischer's Superman cartoons of the 1940s, notably "Mechanical Monsters," plenty of which abound in *Sky Captain*. "I also looked at a documentary from the 1939 World's Fair, titled 'World of Tomorrow,'" he says.

Conran proceeded to create a studio, WOT Inc. (as in World of Tomorrow), to produce the film, which he set up in Van Nuys, Calif. The first step was the creation of storyboards, most of which were drafted by former comic book illustrator Leo Duranona. The studio began staffing not long after, bringing in a talented group of artists. A good number of them came from Disney's then-disintegrating The Secret Lab effects studio. Visual Effects Supervisor Darin Hollings, Animation Supervisor Steve Yamamoto and Compositing Supervisor Stephen Lawes came on board at this time. Hollings immediately began hiring a staff of young-and inexperienced-animators and composers. "This handful of experienced people actually ran a sort of film school and taught these young artists," Conran says proudly. "These folks have now launched themselves into their careers."

Once everyone was on board, in early 2002, the team began planning shots for the film. The team quickly determined that directing actors and crew on a set without sets (i.e., on a completely bluescreened stage) would be a daunting task, so they decided to create an animatic previsualization of the entire film based on Duranona's storyboards.

"We knew that for every shot, we had to break the script down and figure out ahead of time exactly where everything should be: actors, cameras, props," explains Darin Hollings. Steve Yamamoto and his team of four animators built the entire film, with sets and props, in animatic form using **Maya** -- a process which took six months. Included in the process, of course, was Cinematographer Adkins, who planned camera locations and lighting.

In addition to the animatics, Conran also shot rehearsals of particularly difficult or confusing shots using stand-in actors. "Kerry actually wanted to shoot the entire movie in rehearsal in Van Nuys," notes Avnet. "It was a good thing for him, actually, because it gave him a chance to give direction to those actors so he would have a better idea of the kind of direction he would give the principals on the soundstage." Nine months before principal photography began, Avnet held a table reading with the actors; he recorded a soundtrack of this rehearsal and synched the dialogue to the animatics, which enabled Conran to hear and familiarize himself with the real actors' own vocal rhythms.

A technical run-through also took place at the Van Nuys facility. "We took the first couple chapters in the movie and shot them, with the HD cameras, exactly as we were going to do it in London so we could really get a system down of mixing the video from the HD cameras over the animatics, and get comfortable with exactly how we were going to shoot it," explains Hollings. "We figured that if we were going to make any mistakes, we were going to make them in Van Nuys, before we went to London."

In early 2003, the operation moved to **Elstree Film & Television Studios**, located outside London, a short drive for producer/actor Jude Law. Still an independent film at this point, the project had a challenging 29-day shooting schedule in which to capture 1,800 bluescreen shots.

In order to keep production rolling at the required clip (typically 37 setups per day, or about 12 and a half minutes per shot), Conran, Hollings and team devised a system to help transfer what was on the animatics to the bluescreen stage. First, a virtual version of Elstree was built in the computer, with the virtual sets inside it. "If you saw it on the computer," says Conran, "it looked as if you were looking at Elstree Studios, with our little set inside it, as if we'd built it for real." A grid was placed over the virtual set, with grid points numbered like in the game Battleship. "The camera might be sitting on G1, and the actors might move from F12 to G11, and the camera would pan that," explains Conran.

An identical grid was marked onto the floor of the Elstree bluescreen stage. The animatics were available on set, not only for layout purposes but also to help Conran show the concept of the shot to the actors.

Each shot was broken down in prep by Adkins, Hollings and Production Supervisor Matthew Feitschans. "I was responsible for making sure the cameras were in the right place and the actors were in the right place, working out the rough move ahead of time," explains Hollings. Similar setups were grouped together, enabling a quick flow from shot to shot, with similar equipment and camera and lighting setups. "We developed the system in Van Nuys before going over. I wanted to make sure we were coming with a system to shoot that would work like a machine."

Photography was captured using three **Sony** HDW-F900 CineAlta cameras, recording at 4:2:2 RGB onto Sony F500 HD video recorders

(backed up using the cameras' on-board recorders). The images were monitored on HD monitors. "We had every HD monitor in the U.K.," notes Adkins. "We could have used standard-definition monitors, but the delay resulting from down-converting was too disruptive, even if it was only six frames or so."

Adkins, accomplished in visual effects cinematography, shot the majority of the film behind a polarizing filter with the camera's gain set at -3dB. "Because we're on bluescreen, the blue channel in the camera is working overtime and creating some really ugly noise. Setting the gain at -3dB desensitizes all of the chips. We were constantly monitoring so we could easily see if we were clipping highlights." A bluescreen was used instead of greenscreen, he says, mainly because it pulled a clearer key, particularly when shooting Paltrow's wavy blonde hair. "It performed better in over- and underexposure tests with blue."

Adkins was able to capture the actors with a velvety glow-usually achieved with diffusion, this process typically can't be done with bluescreen if a key is to be successfully separated. A careful combination of a polarizing filter and backlighting and edgelighting allowed Adkins to reduce the glare in the actors' faces and give them a softer feel. "One of the telltale signs of video is the shiny, forced look on faces caused by the way HD handles highlights. In a studio environment, you can control those kinds of things."

This softening process was completed during compositing using a process known as "light wrapping," which adds a small amount of diffusion. "It averages the light values from the background and folds them over the foreground live action," explains Conran. "It's like if you held up an object in front of the sun, you'd see the light sort of bleed around the edges."

Once principal photography was completed (a return trip was made in December 2003 for a week of pick-ups), the post process began, in March 2003. Particular attention was given to the completion of a 30-minute test that Avnet would use to sell the film to studios. "When we saw those first comps, we all just went, 'Wow, this really works,'" recalls Avnet.

The backgrounds, with which the live action was combined, were created using CG models built from background plate shots, many of which were shot by Adkins and Hollings. The pair took two one-week trips to New York City (and other locations), shooting stills of various locales around the city on digital still cameras. The stills were later stitched together by modelers back in Van Nuys to create the impressive settings seen in the film. "The New York City streetscape was built entirely in-house. It took them a year and a half," says Conran. The high resolution of the stills also enabled the creation of digitally produced push-in shots with no increase in grain.

Having digital backgrounds allowed the team to make changes to the sets after production had wrapped-something that's not possible with practical sets. On several occasions, settings were changed during compositing if it was deemed that a more attractive solution could be produced. "Also, if things weren't lining up in the shot because we didn't have an animatic for a shot, the background could be fixed," says Avnet.

The distinctive look of the film is due partly to the unusual color application, almost duo-toned in nature, that was used because Conran originally intended to make the feature-length film, like the six-minute

short, in black and white. "Not only had I liked that aesthetic, but using it made it simpler to combine historic black-and-white shots with modern photography," explains Conran. But business being business, black-and-white films are harder to sell, so the production moved to color once Paramount was signed on.

"We actually continued to make the film in black and white," says Conran. "We looked at films like *Black Narcissus* and *Doctor X*, which was in two-strip Technicolor. "We shot in color with the F900. Then, once the keys were pulled from the bluescreen, we converted the footage to black and white and operated that way from that point on. All of the backgrounds and imagery were all black and white." Color was added only at the point of final composite.

Once Paramount signed on as distributor, the release was moved up from Christmas 2004 to summer, eventually landing in September. "We realized that if we were going to complete the film on time, we would have to outsource some of our visual effects," says Hollings. A total of 13 effects houses were used. "We had already done about 700 shots in-house by that time, and we sent out about 900 shots to outside effects houses, which had about 12 or 13 weeks to complete them," says Jon Avnet. (A total of 1,100 effects shots were done in-house.)

Maintaining a consistent look from each of the effects houses was a challenge. That task was overseen by Senior Visual Effects Supervisor Scott Anderson.

The final product was brought to Los Angeles' **EFILM** for final conforming and color timing adjustments using a digital intermediate. "The main thing was that the visual effects shots had been prepared by different vendors around the world, and it became imperative to combine them in such a way that the look of the film remained consistent," explains Colorist Steve Bowen.

EFILM spent one and a half months performing tests, resulting in a change to the production's dynamic range that allowed a greater range for color timing on EFILM's end. The company performed the timing using a 2K DLP projector. "It's been modified extensively to mimic print stock," says Bowen. "When we're timing, we're looking at it exactly as it's going to be printed the following day."

Conran and team have produced a film with a unique look using homegrown techniques to create a fantasy world borne of a comic book imagination. "This was wholesale live action placed in a computer-generated world," says the director. "It's not necessarily that the world is photo-real but that you believe the characters in the world we created."