

CBS Digital Restores Visual Effects to “Star Trek” TV Series

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—Craig Weiss
Director of Visual Effects
CBS Digital
Hollywood, California



Star Trek TOS, Image courtesy of CBS Television Distribution

In the late 1960s, when the starship Enterprise first set course on its five-year mission to explore strange, new worlds, “Star Trek” viewers were introduced to inventions including medical diagnostics, wireless handheld devices, microwave ovens, and desktop computers, envisioned as part of everyday life in the 23rd century.

“Star Trek” creator Gene Roddenberry could never have imagined that just 40 years later, innovative technology from Autodesk, including Autodesk® Inferno®, Autodesk® Flint®, Autodesk® Maya®, Autodesk® Combustion®, and Autodesk® Burn™ software products, would play such a significant role in the restoration and remastering of his beloved science-fiction television series.

Classic Effects Digitally Restored

Now called “Star Trek: The Original Series”—or “Star Trek: TOS” to distinguish it from its many spin-offs—the series was unquestionably ahead of its time, and is now widely credited with setting a bold, new standard for futuristic space themes and settings in movies and TV shows.

Virtually every “Star Trek: TOS” episode featured phasers firing, transporters “beaming” Enterprise crew members to and from planet surfaces, and warp drive and star field effects that gave viewers the sense of the Enterprise speeding through entire galaxies.

Revolutionary for their day, the visual effects were produced using film opticals, a time-consuming, inexact, and laborious method. Today Autodesk’s visual effects and compositing technology is light-years ahead. There were, however, initial butterflies that digitally remastering the series would run the risk of overpowering the quaint, signature effects that “Trekkies” have come to know and love.

“While we are re-creating many of the series’ revered effects elements and shots from scratch, our creative goal has been to digitally restore them to their most pristine condition, without pushing beyond the level of effects that would have been possible in the 1960s,” says Craig Weiss, director of visual effects for CBS Digital in Hollywood, California.

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Turning Out Remastered Episodes at Warp Factor 1

"While it would have been nice to have a year and a half to ramp up for this huge undertaking, the harsh reality was that we had to hit the ground running," says Weiss. "Since we began the work, we've been turning out 30 to 45 visual effects shots per week, oftentimes with 15 to 20 layers per shot."

Since the first remastered episode aired in September 2006, the series' 40th anniversary, CBS Television Distribution has been releasing an episode per week to licensed broadcasters. Originally, 80 episodes were produced, 79 of which were aired in 1966-1969.

The original 35mm film negative rolls were transferred via a high-speed Spirit Datacine onto HDCAM-SR HD tape. From there, high-resolution imagery was ingested into a Sledgehammer storage area network supporting three Autodesk Inferno visual effects compositing systems, one Linux-based Autodesk Flint visual effects compositing system, three seats of Autodesk Combustion for 2D paint and rotoscoping, and 12 seats of Autodesk Maya, the industry's leading 3D animation software.

"What enables us to keep pace with this extremely challenging production schedule is the pure speed of the Autodesk workflow. The Autodesk products allow us to move a huge volume of effects through our pipeline, going from one system to another in a very cost-efficient manner," says Weiss.

"Autodesk Burn has also proven indispensable," adds Weiss. "The system enables our artists to offload any effects shot to a rendering PC. We don't have to tie up our creative workstations or lose momentum waiting for renders."

A CGI Enterprise

The starship Enterprise was re-created in painstaking detail within Maya, and the new CGI model is based on the exact measurements of the original physical model of the Enterprise, which now resides in the Smithsonian Institution in Washington. Exteriors of alien ships, including the fearsome Romulan Birds of Prey and Klingon Battle Cruisers, were also lovingly recreated.

Originally, all 3D planets were re-created in Maya, and then imported into the Inferno compositing environment. The sheer volume of the planet shots, however, spurred Weiss and his team to find a better way. They significantly streamlined the process by creating the planets using 3D geometric spheres, lighting, texture-mapping, and layering tools in Inferno.

"Thirteen years ago, I chose Inferno and Maya for this department," says Weiss. That was long before Autodesk acquired Alias, and since then I've been delighted by the happy marriage of Maya and Inferno. Hopefully, we'll see even more seamless integration between them, to further enhance the speed and efficiency of our already powerful production platform."

Faithful Re-creation

The Inferno compositing system has also been the principal tool for re-creating and compositing multiple layers and passes for star fields, galaxy shots, battle scenes, phaser glows, lighting effects, and all of the imagery in the ship's central "View Screen."

Autodesk Combustion software has been used extensively to spruce up deteriorating or dated matte paintings, including a backdrop that appeared in "The Menagerie," the series' two-hour pilot.

"There was a scenic backdrop in a large window, with many actors standing in front of it," says Weiss. "Using Combustion, we roto-scoped the actors out of the scene, before giving the backdrop a digital face-lift. We then enhanced things further with digital lighting tools, before returning the actors to their places in the foreground."

Working closely with the CBS Television Distribution team, which included Mike Okuda and David Rossi, two of the original "Star Trek" visual effects creators, CBS Digital has been remastering the series to an HD universal master, at 1080/24p, that can support redistribution to broadcast syndication, including SDTV and HDTV, as well as releases to international television markets, and possibly later on, on high-definition DVD formats.



Star Trek TOS, Image courtesy of CBS Television Distribution