



The art of film restoration has been vital to preserving the legacy of many beloved classic films that would otherwise deteriorate in vaults. To date, many well-known classic films have been successfully restored for broadcast or DVD release so they can be appreciated by a new generation of viewers.

Restoration artists tell us they are passionate about understanding the cinematographer's original intent and restoring the film images to their original best — not changing them to please the tastes of modern audiences. At the same time, they want to ensure the best technical quality standards that DVD and HDTV viewers expect.

Restoration

Preserving screen gems is a passion for these pros, and today's tools help streamline the process.

By Claudia Kienzle

DON'T OVERKILL A CLASSIC

"The film look that audiences expected to see on the big screen in 1955 is not the same film look that's considered acceptable today, and if you're not careful, your restoration efforts can be overkill," says Chip Wilkinson, director of marketing and business development for Cineric (www.cineric.com) in New York City.

"Our goal is to restore classic film content faithfully to preserve it for posterity," he adds. "But, occasionally, as is their right, our clients may wish to take creative license and request changes, for example to adjust the colors or contrast slightly, to meet the expectations of today's DVD viewers."

Having restored many films from the 1950s, and having screened many films from that era, Cineric has an understanding of the creative standards of the times, and applied this expertise to the restoration of *Carousel* and *The King and I* for 20th Century Fox.

Both of these 1955 classics had been shot on 55mm film, a format now obsolete, and much of the original negative has been lost. Cineric painstakingly reconstructed and restored the films using a hodgepodge of sources, including print films and optical effects films — whatever elements survived.

"There were horrendous problems, including scratches, dirt, stains and digs," says Wilkinson. "And

because they are older films, they even had color breathing from shot to shot or even within a scene that could be due to differential fading over time, residual processing chemicals or other factors."

Cineric chose to work in 4K resolution using da Vinci's (www.davsys.com) Revival system because it offers artists the flexibility to work in either automated or manual mode, which was very important to them. "In automated mode, the system may identify a negative density spot as dirt when it is actually a reflection in a person's eye. Upon closer scrutiny, you realize it's actually the reflection of the approaching killer holding a knife, and maybe this small touch was characteristic of that particular filmmaker and not something you'd want to take out," says Wilkinson. "You can't ask a computer to make this kind of determination, so there has to be a way to occasionally over-ride the automated clean-up that works well for most of the problems."

Cineric also uses an Oxberry 6400 scanner that accommodates unusual film formats, as well as provides a wet gate that can wash away dust and dirt and fill in scratches so that a cleaner digital file can be captured into Revival. But Wilkinson says, "There are still problems, such as Newton rings [which may look like multi-colored oil slicks or black concentric circles] on the film, and poorly printed red, green and blue separations where the original separation elements no longer exist. These are challenges that are still extremely difficult if not impossible to fully eradicate."

Revival, and Revival for Discreet (which targets users of Autodesk's Discreet Fire, Inferno and Smoke workstations), are resolution-independent software packages offering automatic tools for dirt, dust and grain removal, splice repair, vertical scratch repair, deFlicker, stabilization and deWarp, as well as a Reveal Brush for painting images from one frame or clip to another.

HAIL, HAIL ROCK 'N' RULE!

"Film restoration is a very labor-intensive, artistic process," says Perry Paolantonio, president of Gamma Ray Digital (www.gammaraydigital.com) in Boston. "Ideally, it involves studying film frame by frame to determine where the defects are and making creative judgments about which defects should be removed."



Red Giant's Film Fix uses FAME (Fast Accurate Motion Estimation) algorithms to identify problems. This before and after example uses stock imagery from Artbeats.

For restoration of the 1983 cult film *Rock 'n' Rule*, Paolantonio says, "We sat down with our client [a Florida-based films distributor], and asked them if they wanted to completely clean up all the defects, or to



For 1955's *Carousel*, with Shirley Jones, Cineric used da Vinci Revival to repair "horrendous problems, including scratches, dirt, stains and digs," says Chip Wilkinson.

restore it back to the point where the filmmaker had approved it in 1983. They chose to leave in defects that had been in the original film but remove defects related to wear and tear of the print."

Rock 'n' Rule was an animated feature with a limited theatrical release in 1983 that is now being released on DVD. It's set to rock music from such bands as Earth, Wind and Fire, Lou Reed and Cheap Trick.

"We had difficulty obtaining clean prints," says Paolantonio. "The original element was delivered in five 35mm release print reels which had dirt, splices, scratches and other defects, especially at the heads and tails of each reel. So every 12 to 15 minutes, the film had a flurry of damage that had to be repaired."

Gamma Ray Digital uses MTI's Correct, which supports up to 4K resolution. *Rock 'n' Rule* was restored in 1080/24p but downconverted for the DVD release. The film frames were converted to DPX-HD files for use in MTI Correct, as well as to QuickTime files for use in Adobe After Effects. "While some restoration solutions just blur or conceal defects, which can degrade the image, MTI Correct electronically removes the defect without destroying the film's grain structure, making a fix you'll never see," says

highlights them in red. It then compares the frames before and after it to recompose the damaged area of the frame. Paolantonio says, "Automated filtering can speed up the process for specific types of defects, but I still like to evaluate the film frame by frame to ensure we are truly preserving the character of the film."

MTI Film (www.mtifilm.com) believes the best restoration results come from a combination of manual and automated processing. MTI's Correct can be configured for realtime playback for up to 2K resolution material, with support for up to 4K.

Operators can set-up filter levels for automated processing or use the paint tool for manual repair. Correct Lite offers manual dust-busting and paint tools at a reduced price, targeting DI and VFX.

FIXING CLASSIC TV

Many studios are realizing that the same film restoration technology used to save classic films can also restore classic TV. Instead of handling delicate, disintegrating film elements, artists must now go back to antiquated video playback systems, such as quad or 1-inch tape machines, to transfer and restore content for re-release on DVDs containing all of the episodes in a series.

"It's ironic that as we're moving into the future acquiring equipment for HD and film resolution video, we're also moving back in time acquiring and optimizing video equipment that's virtually extinct," says Frank Donner, president of Advanced Digital Services, or ADS, (www.adshollywood.com) in Hollywood. "We bought four 2-inch Quad machines dating back to the 1970s, which our engineers used to derive two reliably working units. We have over 50 1-inch Type C machines, equipped with Zeus timebase correctors, which bring them back to the state-of-the-art for their time. We could have outsourced the transfer work to a facility that had these older machines, but we bought our own machines because we wanted to control the restoration process starting with the source element."

Donner estimates that ADS's current mix of film restoration work is 60 percent TV and 40 percent film. Among the classic TV series that ADS has re-



Using MTI's Correct to fix *Rock 'n' Rule*, *Gamma Ray* Digital left in the film's original defects, according to Perry Paolantonio, but corrected the problems caused by wear and tear.

stored for DVD are *Johnny Cash and Friends*, a TV series from 1976 that was produced and mastered in color on Quad; and Marvel Comics cartoon animation series, including *Spider-Man* and *Thor*, mastered on 1-inch with a jazz soundtrack. ADS also restored *Sanford and Son* and *The Magnificent Seven*.

"Before we begin any film restoration project, be it film or video, we first do extensive research into the production to discern what the director's creative intention was for that piece," says Donner. "We also test the material endlessly, sometimes at no charge to our customers, and discuss the creative possibilities with our clients so we're satisfied that once the restoration is underway, the project will stay on track with no surprises."

At ADS, the Snell & Wilcox Archangel Ph.C realtime image restoration system is used by artists Tom Sehenuk and Ariel Ticsay. Donner says that not only are they experts in its operation, they worked closely with Snell & Wilcox to bolster its capabilities by offering

a realtime motion-compensated video archive processor to clean up, fix and stabilize damaged or deteriorated video material.

ADS also employed Archangel to restore several films, including Orson Wells' *Macbeth*, the Roy Orbison Foundation's film archives and three (never-before-seen) B&W films produced and directed by Howard Hughes in the 1920's silent era, which required extensive picture restoration including the elimination of scratches, dirt, grain and other defects. Donner says, "We view film restoration as an artistic process to bring a film back to its original look, not to change it, unless the customer requests it."

PROPRIETARY SOLUTIONS

"Now that 98 of the top 100 AFI [American Film Institute] films of all times have already been released to DVD, we're seeing an increase in demand for restoring movies of lesser critical acclaim as well as for restoring classic TV shows to meet the higher quality demands of DVD," says Mike Inchalik, VP of business development for DTS Digital Images (www.dts.com/digital_images), formerly Lowry Digital Images, in Burbank.

"Because clients are bringing in a high volume of work, and titles that don't have the same high retail sales expectations as movie titles like *Casablanca* or *Gone With the Wind*, the whole industry is experiencing a natural downward pressure on price," Inchalik says. "Eventually, many of the top 100 AFI films will likely have to be restored again to optimize them for the significantly higher compression required for HD DVDs. It will be critical for these titles to offer the very best possible picture quality, which HD DVD

consumers will expect."

DTS Digital Images uses proprietary software to tackle film restoration, with new software modules being continually added to handle whatever new restoration challenges come in the door. Rather than putting images through an off-the-shelf realtime restoration system, DTS Digital Images maintains a network of over 500 computers, which can work in parallel to complete a restoration faster, with more effective results.

A LOW-COST SOLUTION

"There is a lot of interest in HD video restoration of classic films headed for HD broadcast or HD DVD, and that is the direction in which we're moving," says Kevin Christopher, director of technology for Cinepost (www.posthouse.com) in Atlanta. "When you do a film transfer to HD, the HD video really shows the flaws, and broadcast and cable networks all want really clean masters for their HDTV broadcasts."

Cinepost is pursuing the acquisition of a telecine system that would allow them to continue to use their Peterson wet gate system. "Full immersion wet gate systems remove and conceal much of the actual surface dirt and base scratches that haven't been printed into the film," says Christopher.

Once the film is transferred, film restoration is done using Film Fix by Red Giant Software (www.redgiantsoftware.com) — a plugin for Adobe After Effects. Christopher says the entire package — PC, capture card, and all the software — runs about \$6,000. "Plus, since we can just use the renderfarm we already set-up for After Effects, we don't have to buy dozens of software licenses to set up a

Chace restores audio for classic *Oklahoma*

BURBANK — With the 50th Anniversary Edition DVD of *Oklahoma* expected in November, people will have the opportunity to hear the Oscar-winning musical as if they were listening to a live performance. "State-of-the-art audio restoration technology is making it possible to compensate for 'wow' and 'flutter,' and other audio recording problems we once thought were unsolvable," says Bob Heiber, president of Chace Audio (www.chace.com).

"We have been able to remove these audio roadblocks using a new technology called Clarity Audio Restoration by Plangent Processes," says Heiber. "Clarity addresses audio recording problems, such as speed fluctuations in the record decks, by mathematically re-timing the audio signals to a fixed and stable time base. The result is perfectly-pitched audio."

Oklahoma, which is being released as a two-disc DVD set by Fox Home Entertainment, will feature two versions of the 1955 classic musical: a Cinemascope version (35mm in ultra-widescreen in 2.55:1 aspect ratio) and a Todd-AO version (65mm/70mm 30fps

widescreen in 2.20:1 aspect ratio).

"Shot contemporaneously by two different camera technologies, the Todd-AO version had sound recorded on a six-track magnetic film, which was in good shape. But the original 35mm four-track Cinemascope mags had deteriorated to the point where they were no longer transferable. Fortunately, in 1992, we were asked by the Goldwyn Company to 'preserve' those recordings, which we did by precisely copying the sound onto analog 2-inch, 24-track Dolby SR tape. That preservation effort in 1992 served as the foundation for our restoration work of the C-Scope version in 2005," says Heiber.

The restored audio masters for *Oklahoma* were recorded digitally at 24-bit, 48KHz in 5.1 channel surround sound onto a TASCAM MX2424. The final deliverables included 35mm Dolby SR magnetic film, DVD-Rs and LTO data tape in the .BWF format; to ensure that the audio would be retrievable in the future, regardless of whatever formats become obsolete.

— C.K.

