Among Film's Ghosts, Its Future

By ERIC A. TAUB

HOLLYWOOD -- MISGUIDED tourists regularly troll the seedy sections of Hollywood Boulevard for bits of film industry lore, unaware that the stars and studios left decades ago. But hidden among the homeless and the sex shops is a structure that is as much a part of Hollywood's future as its past.

Behind cast-iron gates lies the Hollywood Pacific Theater, an Italianate palace originally built (but finished too late) for the 1927 premiere of "The Jazz Singer," the first sound film with some spoken dialogue. It has been closed for years, but recently reopened as a test bed for the motion picture industry's next great technical revolution: digital projection.

Where thousands once congregated in ornate halls, today a handful of film executives and technicians use cellphones to communicate across the dark, ghostly space, awaiting the next screening of test images in the otherwise empty theater. On any given day, Shrek and his friends might be gamboling across the screen or Obi-Wan Kenobi might be dueling with his light saber as experts work to devise standards for the movie theater of the future.

The tests are being conducted by the Digital Cinema Laboratory, an organization set up by the University of Southern California's Entertainment Technology Center. A consortium of seven Hollywood studios have contracted with the laboratory to choose the specifications for the equipment and software with which the industry will one day distribute and project feature films without any film at all.

Some of the testing is scientific, designed to measure, for example, the brightness and sharpness of a digitally projected image on a screen. Experts with the
Entertainment Technology Center use a 25-foot-tall crane fitted with sensors to measure both transmitted and reflected light as it hits various points on the screen as small as one pixel. "We're still in the calibration stage," said Charles S. Swartz, executive director and chief executive of the Entertainment Technology Center. "We're defining the parameters that are important to measure." But because the movie-viewing experience can be a distinctly subjective one, the Digital Cinema Laboratory is also using "expert viewers," motion picture industry professionals, to evaluate picture quality and is considering forming a viewing panel of college students, too. "Picture quality is not a simple question of numbers," Mr. Swartz said. "We need to understand better how our brains fill in parts of a picture to improve its perceived quality, even if that data is not literally on the screen."

Digital projection potentially offers many advantages over today's film-based system. For the moviegoer, digital prints look as good after the 100th showing as after the first. They appear rock-steady when projected, and don't get scratched or covered with dust and hair.

There are also big economic advantages for the studios. They stand to save $1 billion each year if they no longer have to produce and ship film prints to each of the world's 150,000 screens but instead can transmit them as electronic files through a high-speed data link, or physically deliver them on a hard disk or other storage medium.

At the multiplex, films will be stored on a drive, and an operator will simply issue a set of keyboard commands to a server computer to send a film to digital projectors in as many theaters as warranted. Splicing and threading huge rolls of film will be a thing of the past.

But digital projectors are much more expensive than conventional ones, and the computers and other equipment needed are an additional expense for theater owners. Only about 150 theaters in the world are now equipped to show films digitally. While some blockbuster films (including, most notably, "Star Wars: Episode Two - Attack of the Clones," released last year) have been shown digitally, industry executives and engineers regard these as little more than early-technology demonstrations.

"Today's digital cinema systems are not ready to be rolled out," said Michael Karagosian, technical consultant to the National Association of Theater Owners, an industry trade group. "They don't yet produce an image equal to that of film. I thought the 'Star Wars' digital showing looked very bad."

The average viewer might not share that conviction. But with wide-screen high-definition television more accessible than ever, the distinct look of film is losing its grip.
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definition television now available to consumers, there is no question that the technical bar has been raised, just as it was when color television first appeared in the 1950's. Simply reproducing the quality of today's HDTV broadcasts or film while using digital technology is not worth the effort, industry executives agree. Instead, an entirely new level must be achieved. "For digital cinema to succeed, the viewing experience must be better than what customers can see today with 35-millimeter film," said John Fithian, president of the National Association of Theater Owners.

How much better the image must be, and even how "better" is defined, "remain the $64 questions," said Chuck Goldwater, chief executive of Digital Cinema Initiatives, the movie industry consortium created to help set standards. Among the issues that his group and the Digital Cinema Laboratory are addressing are the contrast ratio, color saturation, and lines of resolution needed to give viewers a unique experience when they watch a digitally projected film.

Even the exact point in the theater from which subjective judgments should be made is up for grabs. Does a digitally projected film need to be sharper than a conventionally projected film when a 15-year old views it from the first row, or only when an older person watches from the 35th? While there is still no decision, "consensus is that sharpness should be evaluated only when you're sitting at least as far away as the height of the screen, and most think you should be sitting 50 percent farther away than that," said Mr. Swartz.

"When evaluating picture quality, I tell people to sit where they normally sit," said Doug Darrow, a business manager at Texas Instruments, which created a technology, digital light processing or D.L.P., used in all commercial digital projectors. "Cinematographers often sit two to three screen heights away, but then I've seen grain sniffers who put their nose on the screen to look for picture artifacts."

Theater owners and studios agree that today's digital projectors, which can generally display about 1,300 lines of resolution, are not sufficient. D.L.P. uses special chips that consist of hundreds of thousands of tiny movable mirrors that reflect light according to a digital signal. At a recent trade show, the company demonstrated a new chip capable of displaying a film with a resolution of 2,000 lines.

"The picture was stunning - the audience stood and applauded," said Nick Dager, publisher of the Digital Cinema Report, an Internet trade publication. "Still there was no 'wow' factor there; it was as good as 35-millimeter film, but no better."

Mr. Darrow said that the prototype chip offered a higher contrast ratio, higher resolution and the same number of colors as a film print. "It creates an image that looks like a print struck from the original negative," he said. "The average viewer would perceive it to be sharper than film, with more detail and more colors."

For those filmgoers who tend to wait a few weeks to see a movie, the difference could be even more striking. Over time, most prints get dirty, scratched or gnarled, lowering the perceived sharpness. "Some say a film print is equivalent to 5,000 lines of resolution, but by the time it's been shown a lot, its effective resolution may be no more than 800 lines," Mr. Darrow said.

In addition to determining what constitutes a sharp-enough picture, the Digital Cinema Laboratory is testing different compression and encryption methods to reduce the size of the digital files and developing standards to ensure that the digital picture will be free of flaws and secure from theft when it is transmitted by the movie studio to the server that routes it to theaters.
Executives are concerned about theft because a pristine image presents a tempting prize for movie pirates. A film that is decrypted in a local server before it is sent to a projector sitting just a few feet away could easily be diverted into a thief's laptop simply by rerouting a cable. To prevent that, one idea that is being considered is to keep the film encrypted, decoding it only within the projector as it is being shown. But this could substantially increase the complexity and cost of the projector. So another idea under consideration is to decrypt the film in the server, then re-encrypt it with a simpler coding before it is sent to the projector.

Digital projectors and digital transmission will not replace standard movie projectors and film cans anytime soon. The Digital Cinema Laboratory doesn't expect to complete testing until the end of this year. Digital Cinema Initiatives hopes to establish specifications sometime next year, and the Society of Motion Picture and Television Engineers, an experts group, will then be asked to codify the actual technical standards.

Once the studios and theater owners agree that the conversion is worth the cost - and, more important, agree on who will pay for it - the rollout can begin.

"It's impossible to know when all this will happen," said Mr. Fithian of the National Association of Theater Owners. "But whenever it does, it will be the biggest technological transition in our industry's history."


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