



Smartest Man in the Room

BY JOE FORDHAM

First images fade in on a grimy 'No Trespassing' sign, and then slowly dissolve, rising past layers of fencing, to arrive at an iron gate capped with the monogram 'K.' The montage continues, revealing a wrecked zoo, flooded gondolas, a decrepit golf course, leading to a single window illuminated in a distant mountaintop mansion. The dazzling array of film techniques — rear-projection, miniatures and matte paintings by Vernon Walker, Linwood Dunn and Mario Larrinaga at RKO Pictures' camera effects department — remain as haunting today as they first appeared in the opening of Orson Welles' 1941 film, *Citizen Kane*.

By all accounts, writer Jack Fincher instilled a

fascination with Welles' film in his son, David. And, in the early 1990s, Jack Fincher turned to the creation of *Kane* as inspiration for a screenplay that, in 2020, became the subject of David Fincher's Netflix production, *Mank*.

The title was Hollywood's pet name for irascible screenwriter Herman J. Mankiewicz (Gary Oldman) who, in the opening moments of Fincher's film, is hauled out to an isolated Mojave Desert cabin in Victorville, California, with a typewriter, secretary (Lily Collins) and production overseer (Sam Troughton) in an attempt to concoct a motion picture script for Orson Welles (Tom Burke). The narrative plays chutes and ladders with Mank's memories of his personal life and run-ins with Hollywood society — including bullish M-G-M studio chief Louis B. Mayer (Arless Howard) and millionaire media magnate William Randolph Hearst (Charles Dance) — who informed the creation of a 327-page screenplay for the 24-year-old wunderkind's directorial debut.

David Fincher's film came close to fruition a few years before his father's death. "We had our first conversations about *Mank* about 21 years ago," recalled coproducer Peter Mavromates, a collaborator on Fincher's films since the 1997 thriller *The Game*. "Back then, when we were discussing visual effects, we were talking specifically about matte painting, and we were planning to shoot on film. Producing *Mank* now, our conversations involved how to make digital files look like film. When we shot *Zodiac*, David kept getting asked if digital was as good as film. He is on record saying that digital is not film. It is a different way of working and a different way of seeing. Looking 'like film' has really only been a large discussion on *Mindhunter* and *Mank* because there is a 'found footage' view of things." While Mavromates conferred with visual effects department heads, Fincher served as the production's *de facto* visual effects supervisor. "It was a freeform style of working. David gave our visual effects team a lot of creative liberty, while he took responsibility for visual effects issues on set. There were occasional moments where we encountered a visual effect we hadn't talked about in preproduction, but David was always in control of those decisions, and he always had a strategy."

Fincher and cinematographer Erik Messerschmidt chose to shoot native black and white, using an ultra-high-definition RED camera digital image system with an 8K Helium sensor, which allowed a dynamic range of more than 16 stops. "There were only a few visual effects that we shot in color," stated Mavromates, "and that had to do with the fact that we didn't have enough monochrome cameras. In one sequence, we shot bluescreen, so that was in color."

Though their pipeline was 6K, the filmmakers shot 8K, in a setup carried over from their work with Erik Messerschmidt on the second season of the *Mindhunter* TV series. "Erik and David liked that 8K sensor because it gave them a stop to a stop-and-a-half more latitude," Mavromates explained, "and they didn't want to shoot wide open. For depth of field, as used on *Citizen Kane*, they wanted to close down the iris, and 8K gave them latitude to do that."

Production designer Donald Graham Burt planned soundstage builds at Los Angeles Center Studios, which they combined wherever possible with authentic California locations. That included exteriors of Kemper Campbell Ranch in Apple Valley, 80 miles north of Los Angeles, where Mank wrote his script for Welles. To eliminate unwanted modern structures from the desert ranch horizon, the production used digital retouches. More extensive recreations of Hollywood environs required digital matte paintings.

Artemple Hollywood handled the majority of matte painting duties, along with a handful of Fincher veterans — including Territory Studios, Savage VFX, Industrial Light & Magic and Ollin — together with in-house visual effects artist Christopher Doulgeris who worked closely with Mavromates and film editor Kirk Baxter.

While embracing digital production techniques, the filmmakers took inspiration from classic Hollywood aesthetics, which included shooting actors against in-camera motion picture playback on soundstage sets — recalling the rear projection work of Willis O'Brien, Farciot Edouart and Linwood Dunn — using modern LED technology. "On David's previous films," recalled Mavromates, "he has done a lot of bluescreen or greenscreen work for car interiors. But if you go back to *The Game*, he did a terrific rear screen projection scene — when Michael Douglas and Deborah Unger drive over a bridge at night — and cinematographer Harris Savides did a great in-camera lighting rig for that. David knows rear projection really well. And I thought it was fitting for him to circle back, using a new version of that technology to shoot with a digital camera and recreate a 1930s film look in those scenes."

Fuse Technical Group, which had provided LED lighting rigs for previous Fincher projects, reteamed with Erik Messerschmidt to plan LED playback systems. "We provided LED panel lighting effects for Erik and David in car scenes on *Gone Girl* and *Mindhunter*," noted Fred Waldman, LED solution designer. "But this was the first time that David had planned to shoot directly into LEDs. This was also the first time we had worked in black and white, which is much harder to do." Waldman's team piped imagery across arrays of LED panels

was 6K, the filmmakers shot over from their work with Erik on the second season of the *Mindhunter* and liked that 8K sensor because it gave them "stop-and-a-half more latitude," and they didn't want to shoot on a 35mm field, as used on *Citizen Kane*, to show the iris, and 8K gave them

Donald Graham Burt planned to shoot at the Los Angeles Center Studios, which was as close as possible with authentic California exteriors of Kemper Valley, 80 miles north of Los Angeles. He wrote his script for Welles. To create the modern structures from the desert, the production used digital retouches. The locations of Hollywood environs were used for the setings.

Waldman handled the majority of matte work with a handful of Fincher veterans at Industrial Light & Magic Studios, Savage VFX, Industrial Light & Magic — together with in-house visual effects supervisor Dougeris who worked closely with production editor Kirk Baxter.

Waldman's digital production techniques, which took inspiration from classic cinematography, which included shooting on film and a rear motion picture playback on a screen filling the rear projection work of the production. "On David's previous films," Waldman says, "he has done a lot of bluescreen work for car interiors. But if you go back to the days of a terrific rear screen projection, like in *Blade Runner* with Michael Douglas and Deborah Unger, that was a terrific rear screen projection — and cinematographer Michael Ballhaus did in-camera lighting rig for that. It was done really well. And I thought it was a good idea to go back, using a new version of the technology with a digital camera and render it in those scenes."

Waldman, which had provided LED lighting for Fincher projects, reteamed with Industrial Light & Magic to plan LED playback systems. "We wanted to do lighting effects for Erik and David on *The Girl on the Train* and *Mindhunter*," noted Waldman, "but this was the first time we had worked in a way that is much harder to do." Waldman's solution was to rig a rig of LED playback across arrays of LED panels



Waldman (left) and Fincher (right) on the set of *The Girl on the Train*. Waldman is holding a newspaper with the headline 'TOURISTS' FLOOD CAL'. The photo is credited to David LaChapelle.

— modular tiles, 500 millimeters square, with 2.8-millimeter pixel-pitch between red, blue and green diodes — resulting in high-resolution images capable of emulating the dynamic range of the monochrome production photography. "We were taking a mixture of red, blue, and green to make white, or perceived grayscale. Erik and David were very scientific in the way they approached their shots. They understood you need to have high-quality data. Sometimes we had an 8K file playing back on a 4K screen, and because we had that resolution, we were able to move files around and punch into particular areas."

Waldman installed an on-set team — project manager Colin Feeney, media server programmer Rob Mallin, and media server operator Kaiwen Fa — who worked with Fincher, Messerschmidt and gaffer Danny Gonzalez to integrate 6K playback. The largest background images filled an 18x32-foot wall of LED panels, while smaller free-floating arrays were positioned around the set with soundstage lighting. "Our first criteria was good content," said Waldman. "We got involved in preproduction quantifying color gradients, doing previs and techvis with Erik and his team to make sure we could figure out as much as possible in the computer to save time on set. Our second

criterion was having a good file-naming structure, because we were dealing with terabytes of footage."

Although LED background images were most often mastered in native black and white, the architecture of the monochromatic image made extensive use of color lookup tables — LUTs — to manage image quality control. "We were using a full RGB 10-bit pipeline," said Rob Mallin. "To do that, we were using a codec called NotchLC. In addition to all of that, we worked directly with the colorist on set. He delivered creative LUTs to us that we could then apply, and that gave us the most flexibility. We stared in 'log color' space, and then we would apply a LUT on the output side."

Preproduction tests helped to troubleshoot screen flicker, image banding or moiré anomalies, and enabled delivery of high-quality playback images through chroma subsampling. "When you're doing real-time playback for screens of this size," explained Fuse LED image technician Jared LeClair, "data adds up until you can't play back the media in a way that performs and looks good. It's a balancing act of resolution and quality, so we put a lot of thought into how best to deliver the information in those files to get the most out of them at playback. That required a lot of research, figuring out the right color management configuration to give us the greatest latitude for image adjustment on set."



At the invitation
 of screenwriting
 Charles Lederer
 (left), Mank takes
 the California coast
 to the palatial
 Kemper Campbell
 ranch. Gary
 Oldman (right) plays
 Mank's
 brother, struggling
 writer
 Leo Broussard.
 In a limousine
 (left), Mank's
 brother, struggling
 writer
 Leo Broussard
 (right) takes
 the Hollywood
 Boulevard
 limousine
 to the
 Hollywood
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That depended on all the different pieces of engineering in the chain, and what the content provider was able to feasibly output — how much content there was, how many scenes. It was very useful having a series of LUTs that created predictable transforms on the image. That gave us a visual vocabulary, and we went from there.”

Many images sourced for LED playback included visual effects or full CG environments that reunited Fincher — a former ILM matte photography assistant — with the gamut of digital matte painting techniques. “I trained as a production designer,” recalled Artemple visual effects supervisor Wei Zheng. “I do oil painting all the time, and I like to apply those techniques to 3D environment creation. Today’s computer software is so powerful, we can use 3D, 2D, 2½D and really take advantage of a painter’s skill.” A pivotal scene in *Zodiac* — a San Francisco setting at the intersection of Washington and Cherry Streets, re-created at Digital Domain — remained a talking point for environment construction. “Back then, David shot a minimal set view of the street, some steps leading to a couple of buildings. We used 3D matte painting techniques to build that environment. Since then, we have built on that technique. When David shoots a scene, he knows what elements he needs. Once we had the plates, I’d create a very photorealistic mockup at 6K, and we aimed to turn that mockup into the final shot. It was an efficient way to work. After David gave his green check mark of approval, our work was a continuation, contributing to the final quality of a shot. We sometimes went through two or three iterations; most often, we nailed it right away.”

The production shoot began at Los Angeles locations November 2019 and wrapped three months later, miraculously before the world shifted on its axis due to coronavirus pandemic concerns. As other film productions scrambled to adopt remote file-sharing technical infrastructures, the transition was relatively seamless for Fincher’s postproduction team. “We’d already been working remotely for a long time with David,” commented Peter Mavromates. “David had moved to Pittsburgh to shoot both seasons of *Mindhunter*, while we kept editorial in L.A. We used PIX as our platform and posted shots to that network every day. We already had half the etiquette solidly in place, and we continued a practice that we’d been implementing for 20 years, taking edit systems and accessing them remotely. Our first assistant editor, Ben Inslar, pulled all those systems together. We finished shooting the last week of February. The first official day of the pandemic was Wednesday, March 11. By the following Tuesday, our whole crew was remote. We didn’t miss a beat and, for the most part, it was very successful.”

Opening the film, two limousines blast down a California desert highway, transporting Mank and his retinue to the Kemper Campbell Ranch, where the gregarious writer is confined to quarters with his right leg in a plaster cast. Mank’s omnipresent injury required a period plaster cast created as a collaboration between property and wardrobe departments and makeup effects by Alterian Inc. “They needed an entire lower-body cast for Gary Oldman,” recalled Alterian founder Tony Gardner, “and it had to be true to how they set a broken leg in those days — from the mid-stomach all the way down one leg. It had to be solid, and it had to look like it was made out of 1940s material — plaster, not fiberglass or modern casting compounds. However, we knew if we used real plaster bandages it would come apart during filming. We figured out a method for using fabric and urethane that allowed us make a leg and body cast that had the thickness they needed, with padding. Gary needed to be able get in and out of it fairly easily, as well. Essentially we built him a rigid pair of pants.”

Alterian produced material tests, which they photographed in black and white to ensure camera accuracy. Oldman submitted to body-casting and fitting sessions and, as a veteran of many previous classic makeup effects, used the process to Zen into his role. “Gary warned us that he was planning to gain weight to play the character,” noted Gardner. “As long as we could tolerate that, he was good to go. It was impressive watching him get into character in fittings. He had a prop cigarette holder and he’d play with that, bouncing around and making it look like he lived in that world.” Alterian created multiple versions of Mank’s cast to serve scene requirements and performer needs. “We gave Gary a flesh-tone synthetic spandex legging for his right leg. After he put that on, it was powdered and the cast slid on much more easily. The spandex acted as a wicking material, to draw sweat, and helped keep him warm.” The urethane allowed flex as Oldman lowered himself into the cast. Ambulatory scenes featured a full one-piece cast with added traction beneath the foot. For bedridden scenes, Alterian created versions with a cutaway posterior and a split in the back of the ankle that enabled easier application and removal.

From his ranch house bed, Mank recalls the incident that led to his injury a few weeks earlier, on a drive with a fellow writer (Sean Persaud) who crashed his open top convertible on a desert highway. The production captured car exteriors on a rural road. Fred Waldman’s team staged moments leading up to the crash with performers on a soundstage LED-playback shoot. “The convertible was elevated on a rig,” said Colin Feeney. “They did some editing to the background plates from