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ISSUE #45 - SINNERS

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COVER IMAGE
Ryan Coogler’s *Sinners* tells the story of Smoke and Stack, both played by Michael B. Jordan, in 1930s Mississippi. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

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THE VFX OF ‘SINNERS’: A COLLABORATION STORY

Inside this special edition of befores & afters magazine.
By Ian Failes.

Ryan Coogler’s *Sinners* is set against the backdrop of the Mississippi Delta in 1932 and sees Michael B. Jordan portray twin brothers, Smoke and Stack, who return to their hometown, only to face a malevolent supernatural force, namely, vampires.

Bringing the vampires to life, and then orchestrating Michael B. Jordan as twins, were, unsurprisingly, two of *Sinners’* principal effects challenges. What’s more, Coogler and cinematographer Autumn Durald Arkapaw chose to shoot on 65mm film using a combination of IMAX 15-perf and Ultra Panavision 70 cameras, bringing additional challenges for the VFX teams in terms of the need to follow more traditional film workflows.

The film would ultimately feature 1013 visual effects shots overseen by visual effects supervisor Michael Ralla and visual effects producer James Alexander, and crafted by Storm Studios, Rising Sun Pictures, Industrial Light & Magic, Base FX, Light VFX, Outpost VFX, TFX and an in-house team. Baraboom Studios carried out previsualization services.

The story of how *Sinners’* effects were created might normally be told here in *befores & afters* magazine principally via conversations with the visual effects and practical effects teams. Certainly, these crew members are heavily featured in this issue. But we were lucky enough to go further thanks to the efforts of Michael Ralla and dive even deeper into the production of the film. Evidencing the close collaboration between departments, we talk not only to the principal VFX partners, but also to many of the different department heads and crew members.

Indeed, this issue features the following contributors to *Sinners*:

- executive producer/composer Ludwig Göransson,
- director of photography Autumn Durald Arkapaw,
- production designer Hannah Beachler,
- costume designer Ruth Carter,
- editor Michael Shawver,
- Technocrane operator Ron Tatham,
- video assist operator Dan Furst,
- production sound mixer Chris Welcker,
- co-producer/post-production supervisor Tina Anderson,
- visual effects supervisor Michael Ralla,
- visual effects producer James Alexander,
- special effects supervisor Donnie Dean,
- prosthetic make-up designer/special effects make-up designer Mike Fontaine,

< Sinners director Ryan Coogler, at left, holds a chrome ball and Macbeth chart during filming for the final confrontration with Remmick. Also pictured are Miles Caton as Sammie and Jack O'Connell as Remmick.

- stunt coordinator Andy Gill,
- visual effects supervisor at Storm Studios, Espen Nordahl,
- visual effects supervisor at Industrial Light & Magic, Nick Marshall,
- visual effects supervisor at Rising Sun Pictures, Guido Wolter,
- visual effects supervisor at Outpost VFX, Ian Fellows,
- visual effects supervisor at Light VFX, Antoine Moulineau,
- 65mm project supervisor at FotoKem, Andrew Oran,
- principal color scientist at FotoKem, Joseph Slomka,
- digital intermediate supervising colorist at FotoKem, Kostas Theodosiou,
- digital intermediate lead finishing producer at FotoKem, Angelique Perez-Brennan.

These professionals share their insights on the wide ranging effects work in *Sinners*. This includes breaking down the key collaborations between departments that made twinning possible and the mix of practical make-up effects and digital effects for the vampires. There's also significant coverage of other key moments, such as that powerful musical ancestors oner in the juke joint, the train station scene, the snake and more. **b&a**

> Coogler (right) discusses a scene with Michael B. Jordan, who played both Smoke and Stack in the film.


IMAX
IMAX
IMAX

FILMING, FILM FORMATS AND THE BEAUTY OF ‘SINNERS’

How shooting on film challenged all the departments.
By Ian Failes.

For *Sinners*, the filmmakers turned to widescreen format Ultra Panavision 70. The production employed Panavision’s System 65 cameras paired with vintage Ultra Panatar lenses, which use a 1.25x anamorphic squeeze to produce an expansive 2.76:1 aspect ratio on 65mm 5-perf film. Several sequences were also shot in 15-perf 70mm IMAX format (1.43:1 when fully expanded).

At nearly 100 pounds apiece, the cameras utilized by cinematographer Autumn Durald Arkapaw were formidable both in size and handling, but the visual payoff was undeniable, especially for audience members able to view the film in 70mm projection or on IMAX. Ultra Panavision 70 was a format utilized on Quentin Tarantino’s *The Hateful Eight*, while filmmakers like Christopher Nolan have helped revive interest in 65mm cinematography more broadly through their use of Panavision System 65 and IMAX formats.

Originally, Coogler was looking to shoot in 16mm, before considering 35mm. It was the studio, Warner Bros., that then suggested filming in large format. At this point, Arkapaw called Panavision, who connected her with IMAX. “We wanted to do a test with a range of formats including 35mm and look at them projected,” she tells *befores & afters*. “We got a bunch of cameras together and went out to the desert in Lancaster and we shot a test. We shot 65mm 5-perf and 65mm 15-perf, and we projected it at the 70mm projection room that Fotokem has in Burbank. Then we went out to IMAX in Playa Vista and looked at our 15-perf dailies projected in 70mm. We also put together an edit of the two formats together which we watched projected to see how it felt jumping between the two ratios. It didn't bump us, we thought it could work. From that moment on, Ryan was really excited, and we both fell in love with the large format approach.”

The decision to shoot on film in those formats would ultimately bring with it a number of significant challenges for Michael Ralla and the visual effects partners on the film. Still, Ralla was equally impressed by that desert test footage. “It started with 2.76:1 footage,” he recalls, “and then it switched to 15/70 IMAX without any warning. All of the sudden the screen exploded and it was incredible. I remember sitting there going, ‘Wow, what just happened?’ Perceptually and creatively, I was really blown away when I saw that.”

Ralla, looking for some guidance on the photochemical

< Coogler with Jordan and Delroy Lindo (Delta Slim) during filming of a car ride. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> Sinners was shot in IMAX (at left) and 65mm. Several sequences were shot in 15-perf 70mm IMAX format which is 1.43:1 when fully expanded. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


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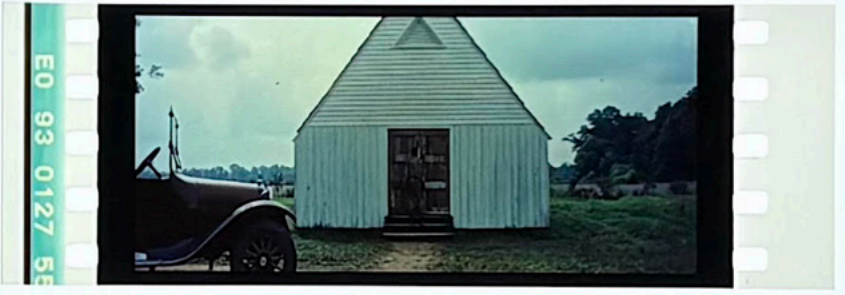
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workflow, turned to veteran visual effects designer John Dykstra, who had visual effects supervised *The Hateful Eight,* via an introduction from post-production supervisor Tina Anderson (who was on both *The Hateful Eight* and *Sinners*). Recalls Ralla: “Tina said to me, ‘Oh you want to know about 65mm and VFX? Just call John Dykstra.’ My visual effects producer James Alexander and I had the pleasure of doing a one hour phone call with John. He gave us some incredibly valuable advice. He told us, ‘If you can, do daily reviews with film prints, because then you can watch it only once.’ And then during production he would keep checking in—‘How are you boys doing?’, sort of thing.”

“I also called Andrew Jackson who has been working with Chris Nolan on *Dunkirk* and *Tenet* and *Oppenheimer*,” adds Ralla. “I had worked as a compositor on the film *Knowing* that he supervised. He talked through the process on the Nolan films for us.”

Shooting on film did mean a change from the typical visual effects workflow that many VFX supervisors and artists might be used to. For example, it brought with it DPX files, uncompressed (meaning large) file sizes, Cineon color space, 10-bit and no CDLs (color decision lists). During filming, it also meant only a relatively low-resolution video tap could be seen and recorded from on-set, with a telecine approach necessary for editorial, and finally laser film scans for VFX work. It’s certainly something VFX studios have dealt with in the past, prior to modern digital workflows, but is now only rare in theatrical releases.

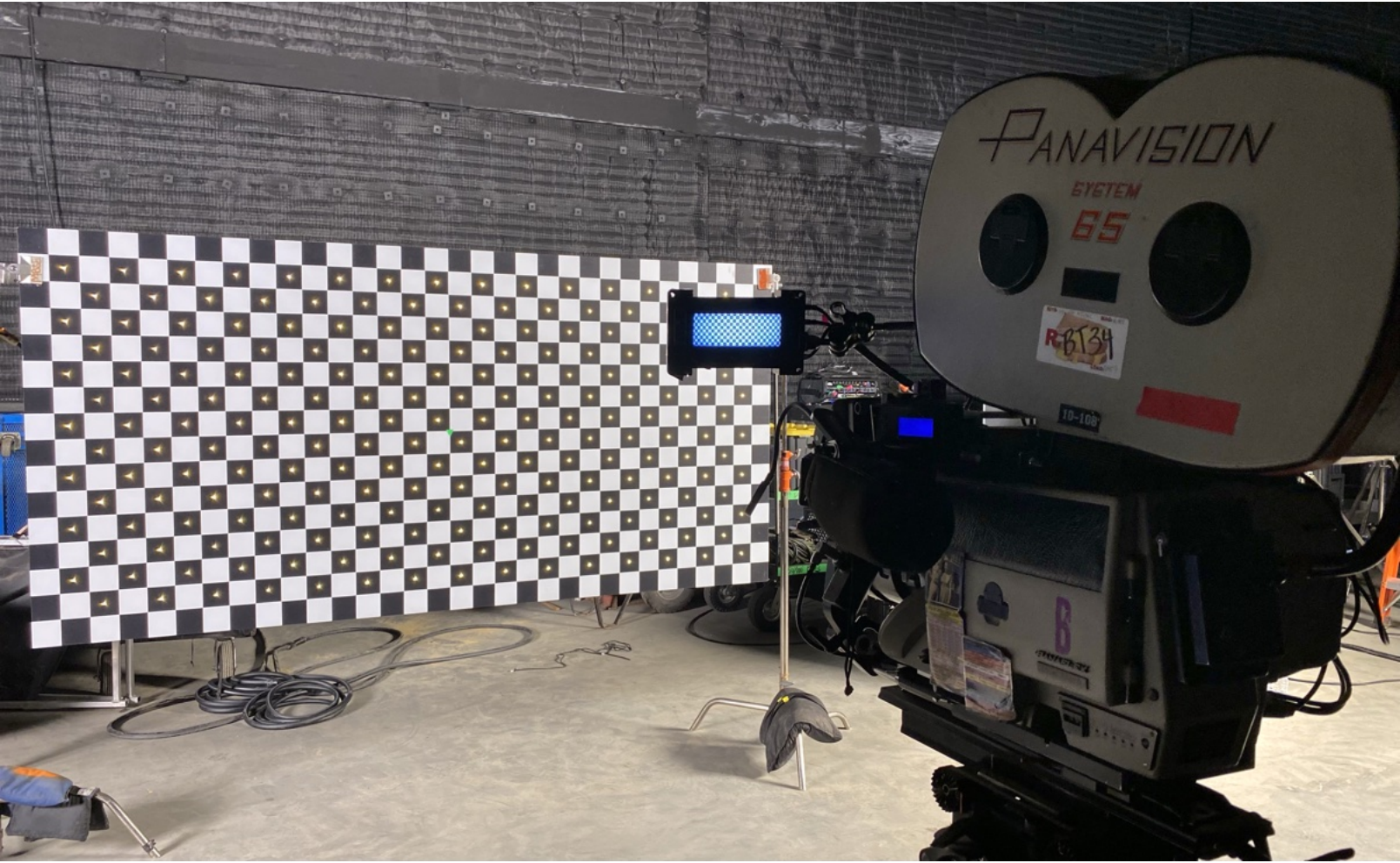
> A lens mapping project was undertaken on the film to digitally profile lenses, a continuation of work done with DOP Autumn Durald Arkapaw on Black Panther: Wakanda Forever.

“When you shoot digital, you just go get your files and send it off to your VFX company,” discusses Anderson, who was also a co-producer on *Sinners*. “With film, and especially large format film, there's a lot more steps that go into scanning and recording. For example, by the very nature of IMAX film, there’s literally only one lab where you can do scanning. Everything was done in partnership with IMAX and with FotoKem. Both vendors can scan and record 5-perf and 15-perf. We typically do the 5-perf work at FotoKem and the 15-perf at IMAX because that's their format.”

“In terms of dailies,” continues Anderson, “all of our negative for our dailies that goes into the Avid to editing was done as a HD telecine on a Millennium at FotoKem. There isn't a CDL—if you're on a digital show, all of your dailies go through your digital dailies pipeline and a CDL is created so that then when you go to start pulling your data and sending your shots to the vendors, there's an accompanying CDL. Instead, the visual effects studios rely on the show LUT for their VFX shots, which was created by FotoKem’s Kostas Theodosiou.”

“It's very different,” remarks Ralla, in terms of the workflow. “You're shipping around physical media. We were shooting in Louisiana. The only lab left that can process film like this is FotoKem in Burbank. What that meant was, we were shipping back exposed film that is still light sensitive because it hadn’t been developed, from Louisiana. We were not anywhere near the airport, we were in the swamps hanging out with the alligators! A courier would drop off the film canisters at the airport. We had two flights flying to Burbank every day. I mean, it’s kind of crazy—you put physical media on a plane, but it's not developed, and it's the only copy you have!”

“That film got dropped off at FotoKem, they develop it, and then it goes through a telecine machine, which allows you to, in real-time, get a digital representation of what you just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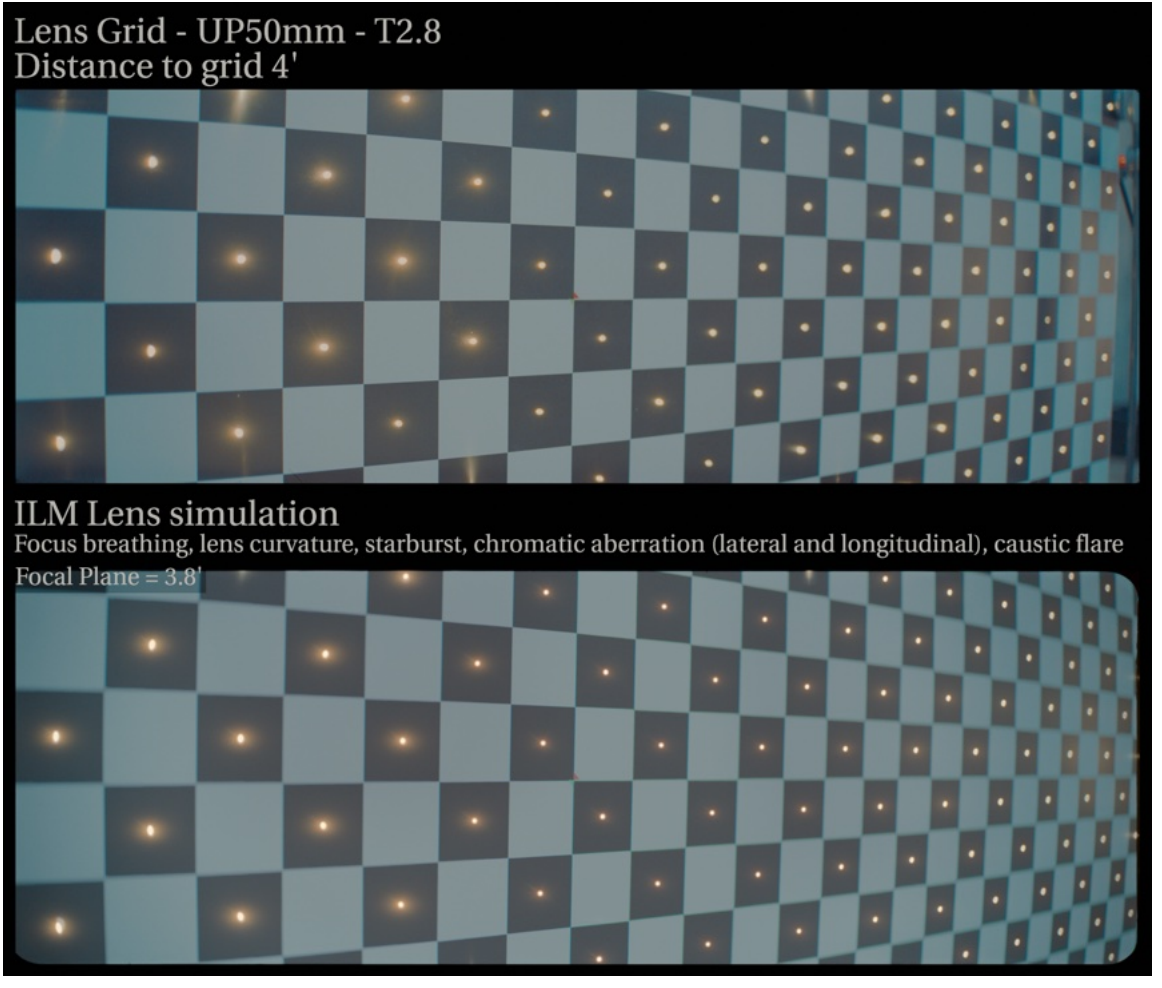

Lens Grid - UP50mm - T2.8
Distance to grid 4'
ILM Lens simulation
Focus breathing, lens curvature, starburst, chromatic aberration (lateral and longitudinal), caustic flare
Focal Plane = 3.8'

shot. There's a colorist color correcting in real-time with a mixture of printer lights or analog controls and digital color correction tools. But there's no records of any of that, it happens on the fly. That's used by editor Michael Shawver and Ryan in the Avid to cut the film.

For visual effects work, Ralla's team needed high resolution scans, around 8K. While FotoKem developed the film, telecined the dailies, and was responsible for the final grade, the 15-perf IMAX footage had to be scanned at IMAX in Playa Vista. "This is on the other side of Los Angeles!" notes Ralla. "Sometimes the film needed to go back and forth between Playa Vista and Burbank—-there were so many reels and a lot of to and fro. It's like traveling back in time, but of course, it was all completely worth it."

These film scans were in DPX format, something that Ralla admits he was a little frustrated with at first—"They are large files, and an old-school color space," he says. The ultimate result was that the VFX partners on the film received raw representations of what the film negative looked like. This brought up a further issue the VFX partners had to deal with. "We shot Kodak 5219 500T tungsten film stock," advises Ralla. "That's a film that's sensitive to 3200 Kelvin. So the moment you use it in daylight, everything turns blue. The VFX partners would see the telecine dailies, which looked fine, but then the scans were blue and dark. They'd say, 'Where's the CDL?' Well, there is no CDL. It essentially meant they would have to match grade by hand, manually, to the look of the telecine their round trip version zero, so that Ryan Coogler would see something that was at least remotely similar to what he already had in the edit."

Arkapaw and Ralla had collaborated previously on *Black Panther: Wakanda Forever*, where Ralla was the second unit and additional visual effects supervisor. It was during that production that the DOP had asked Ralla, in relation to her earlier visual effects experiences, 'Why does VFX make shit up?' It was said in jest, but Arkapaw did mean it—she had felt that some of the consistency with lenses and lighting that she aimed for during shooting were sometimes departed from in the finished visual effects work, where the DOP was rarely part of the discussions in terms of shot design and digital lighting.

"The result of all this, and coming out of *Wakanda Forever*, was that we wanted to create a toolkit for the VFX partners where they knew the kind of style of shooting I had, the framing, and the lighting, that I appreciate," details Arkapaw. "I'd then be on calls with the VFX artists later on because I wanted to teach these artists how to recreate what we were doing on set, making sure as they add to the image in post, what they're adding is consistent with the lens so that the composites don't look fake and the backgrounds aren't too sharp when they're not supposed to be."

That process actually began with a detailed lens mapping stage. Ralla had on *Wakanda Forever* already shepherded an effort in conjunction with Arkapaw and Wētā FX to shoot lens maps, charts and grids and break down the lens characteristics. The idea was to produce a 'lens bible' for the visual effects studios on that film. It was something that was continued on *Sinners* for Arkapaw's particular lens choices and, notably, the aberrations built into them.

"For *Wakanda Forever*," recounts Ralla, "I think we shot terabytes and terabytes of data for mapping lenses, which was easy to do, shooting digitally. But on *Sinners*, well, that's film. I remember the call with the line producer when I told him how many minutes we would need per lens, and he was

< This image showcases an ILM lens simulation aimed at mimicking analog flaws like lens aberrations, grain, halation, focus breathing and gate weave.

like, ‘Uh, can we talk about this?’ So I condensed the set, and we shot at 12 frames per second instead of 24, because that works just as well but saves 50% of the film stock.”

An updated lens bible profiling the lenses was prepared, taking into account the characteristics of film stock like grain and halation, and what might be described as the ‘movement’ of the film over a shot. There were also elements like dust and scratches that might be present on the film—all things that needed to be replicated in the digital visual effects work.

The intention of the lens mapping, as well, was that this would form a way of training VFX artists, especially compositors, who might have never worked on film before. “We set up several seminars with all the VFX partners and their compositors—sometimes a hundred people on one call—just to talk about lenses,” notes Ralla. “I told them about the terminology so that they would be able to identify what something is and actually have a name for it. It was also about how something might be re-created in Nuke, and looking at the charts and assessing how much of a particular look the lens was actually adding.”

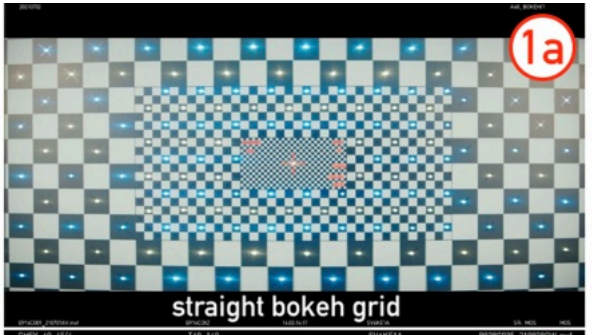
Ralla would furthermore take note of Arkapaw’s shooting style. “The thing that she explained to me was, ‘I always like to have shallow depth of field with a background out of focus. I like to be really wide, low and tight.’ So what that means is, she would use wide angle lenses to actually shoot close-ups—it's not necessarily always a longer lens, which you would normally do. The other thing that stood out was that she was getting a background that was out of focus, but it's not mushy, there's a lot of definition. That's a result of spherical aberration being corrected which creates hard-edged bokehs.”

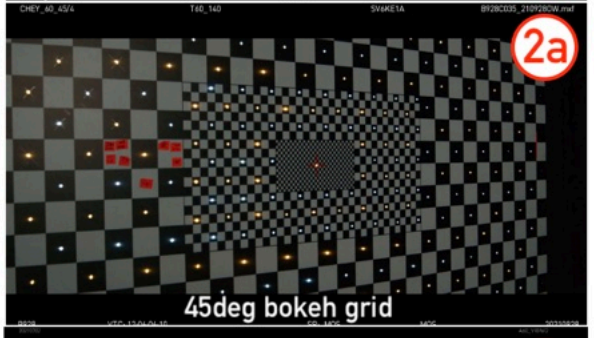
“On longer lenses,” adds Ralla, “she likes the exact opposite. That's when she wants the background to become really creamy. You get these really soft bokeh edges that just flow into each other. It should just be a soup and a wash of colors in the background.”

All of this was important for visual effects shots, and especially for a few all-CG shots, in the film. For example, a set of sunrise shots that became a crucial storytelling point were completely CG shots handled by Storm Studios. “For those all-CG shots, it was absolutely critical that not only were the lens characteristics properly matched, but they also needed to be framed and composed, as well as lit, in Autumn’s style,” suggests Ralla. “We did a virtual scout with her in that entire CG environment and said, ‘Where do you want us to put the camera?’ That was really helpful. And then we started by adding some foreground out of focus and some bugs here and there. Then Autumn saw that and said, ‘Let’s remove all this shit, I would never shoot it this way.’ Which was also great. Then she saw a lens flare we added and said, ‘This is not my flare, where’s this flare coming from?’ I said, ‘It's one of the photographic flares. She said, ‘But not from that lens.’ I looked it up and of course, Autumn was right. It was a flare from the 80mm lens, not the 50mm. She just knew.” **b&a**

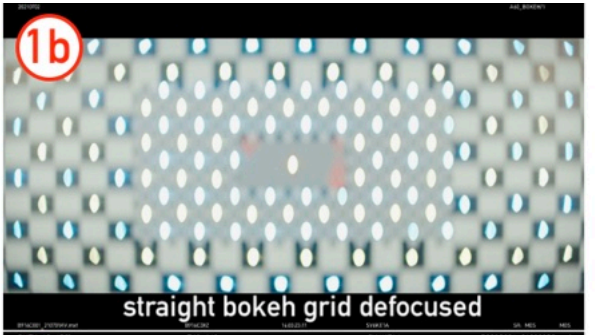
> Bokeh grids and flare charts used to help mimic analog lens aberrations into digital composites. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Some sunrise shots became fully CG ones developed by Storm Studios, which worked closely with DOP Autumn Durald Arkapaw to match what would have been achieved with practical photography. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


1a
straight bokeh grid


2a
45deg bokeh grid


3
Vignette map


1b
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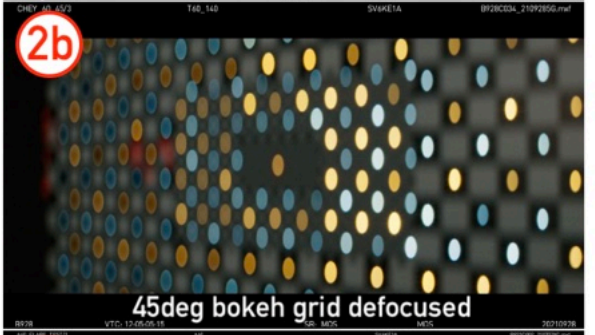

2b
45deg bokeh grid defocused


4
Flare chart

THE ART OF TWINNING

How to put two Michael B. Jordans on screen.
By Ian Failes.

In *Sinners*, Michael B. Jordan delivers a magnetic dual performance as the twin brothers Smoke and Stack—two men returning to their hometown in search of redemption. Jordan distinguishes each brother with remarkable precision, crafting unique voices, demeanors and emotional depths. Several sequences feature Smoke and Stack together (and even fighting) in the same frame. For that twinning work, a full gamut of shooting and filming techniques were utilized. These ranged from simple splitscreens to more complicated ones, and to machine learning methods that incorporated a purpose-built rig—the Halo rig—used to record Jordan's performances for the twins.

"Twinning certainly became a significant part of the visual effects that we undertook," comments visual effects producer James Alexander. "We made up a decision matrix for how a twinning shot would be done. It was such an analog and tactile proposal, knowing that the visual effects would have to be, for the most part, invisible and in support of everything that was on celluloid, was such an appealing part of the project."

From Arkapaw's point of view, the DOP wanted the twinning moments "to feel as if I shot both of these people in-camera, which we effectively did as much as we could. We shot Michael acting in both roles. Michael Ralla did a great presentation on the different ways we could do this. We looked at all of the avenues and then went through the script and honed in on what scenes we would need, say, the Technodolly, what scenes were splitscreen, and what scenes needed a head replacement. But it was always thinking about using as much real footage in-camera as possible."

Some of the simplest splitscreens involved Smoke and Stack talking to each other or someone else in a locked-off, or a relatively locked-off, shot. "The one shot that comes to my mind," says Ralla, "is Hogwood (Dave Maldonado) saying, 'You boys, twins?', and the reply comes, 'No, we cousins.' For that shot, Michael played Smoke standing on the right side, smoking a cigarette. We had a body double, Percy Bell, standing next to him dressed as Stack, also to cast a shadow. Then Michael would go to the trailer, and costume designer Ruth Carter would re-dress him as the other twin, and he'd come back. We'd shoot the other side as quickly as we could so that the lighting changed as little as possible. That was a simple splitscreen."

When there was dialogue, these splitscreens then required sound synchronization and the use of video playback to broadcast the lines Jordan had said previously, with the lines of the double scrubbed. An on-set team made that possible, also adding in ADR beeps where there were more than just the twins in the scene so that Jordan knew when to start his lines.

Occasionally, Jordan acted against a tennis ball—to some

< Michael B. Jordan as Smoke (in blue hat) and as Stack (red hat). A variety of twinning techniques were utilized to make it appear as if the actor was in the same frame as two different characters, from splitscreens to digital replacements using machine learning techniques.

hilarity on set—while at one point a monitor on a stand was employed for Jordan to act against so that he could see his previous performance. “The problem was,” reveals Ralla, “Michael is also a director, so when he saw himself delivering his previous performance, he wasn't acting with it, he was actually evaluating his performance using his director brain. So that monitor went away. It wasn't working. Then we played back his voice, but it was really weird for him to hear his own voice. So then we had the double saying the lines of what of the A-side, so that it would feel more natural for Michael and that's how we moved forward for those easiest cases.”

For the next step up in terms of kinds of twinning shots—with moving cameras—the Technodolly approach was undertaken. It allowed for recording moves and the recalling of moves in sync with audio and video. “It's such a mobile piece of kit as opposed to a more traditional kind of motion control on rails,” notes Alexander.

The standout Technodolly twinning shot was the moving shot of Smoke and Stack as they wait at their car for Hogwood, and share a cigarette between them. Stack rolls the cigarette, and then hands it off to Smoke, who grabs it, takes a puff, hands it back to Stack, who now takes a puff, and then hands it back again. “That shot is a little bit of a unicorn among the twinning work,” says Ralla. “It’s the first time we see them and it’s also a reveal. First we see one of them, and then we see both, so it had to have camera movement. It’s also a great way to see how Michael was developing different body language and mannerisms between Smoke and Stack.”

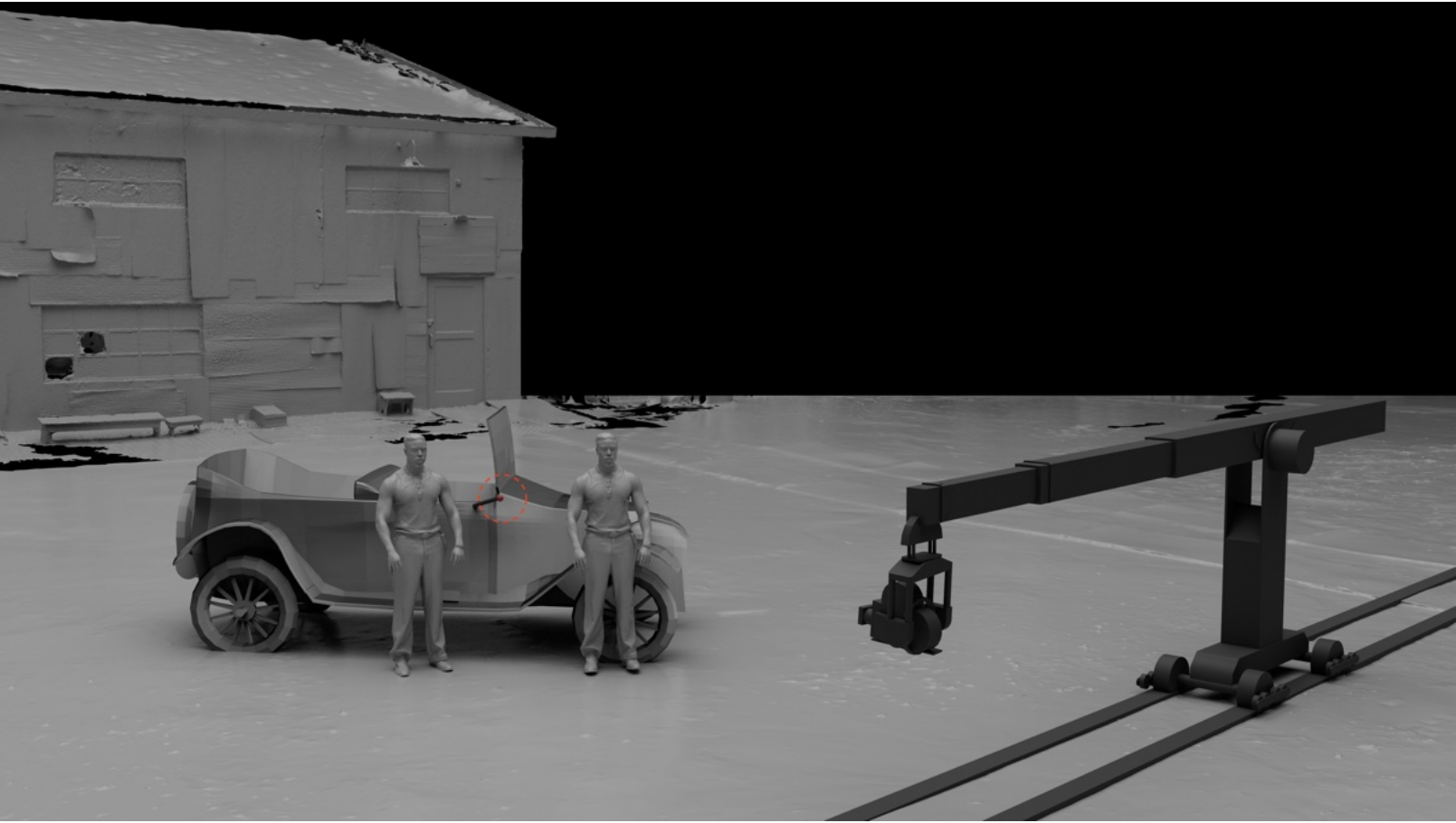
> A visualization frame used to help plan out the cigarette swapping moment between Smoke and Stack. A carbon fiber pole on the car was used as a spatial marker.

“Even though it had camera movement and even though it had interaction,” notes Ralla, “I didn’t want the first reveal of the twins to be a body double with Michael's head or face. I wanted to use a *Jurassic Park* approach. On that film, there’s only something like 63 digital dinosaur shots. But every single appearance matters, there's a lot of other dino moments, but they're implicit, like the ripple in the glass. So, we wanted to do something very similar, where we established tentpole shots at only certain moments in the script, that is, where we’d just go the hard route and actually shoot Michael full-body, twice, even with interactions and lots of camera movement, just to put in these anchors of real-Michael as much as possible.”

The cigarette swap was a shot that first went through a series of testing six weeks before the start of principal photography. “For a variety of different reasons,” states Ralla, “I wanted the crew and Autumn to get used to the Technodolly and the whole workflow. I'm also a big fan of doing a ‘Pepsi challenge’, where we try different options and compare them in the same exact setup, or we shoot a real reference and then build a CG equivalent and compare the two.”

“The idea behind the Pepsi challenge for the cigarette swap,” says Alexander, “was that we could put them next to each other when they were both finished and hopefully Ryan wouldn't be able to tell the difference. Importantly, I learned things about the Technodolly that I hadn't appreciated before that, for instance, you can uncouple all of the motors and you can move the head around like a Steadicam, almost, and that move is recordable and repeatable. It was an incredible tool.”

The cigarette handover test was filmed as a swap happening multiple times, using the Technodolly. “It had a crazy number of hand-offs,” recalls Ron Tatham, credited as



Technocrane operator. “I think there were at least 10 hand-offs. It was really rad, but we were just trying to figure out how far we could take this. That camera test was also about getting all departments in a rhythm and figuring out the workflow for how it was going to be shot for real.”

At the same time, the team shot everything that would be needed to do a digital face replacement. The splitscreen composite was given to Storm Studios (which also carried out the actual final shot). For the digital face replacement side of the test, Ralla and Alexander had brought on Rising Sun Pictures.

Earlier, a range of solutions for digital face replacement had been explored, including volumetric capture and other capture techniques. One issue, however, that immediately became apparent for Ralla was the desire of the *Sinners* filmmakers to “focus on story and be in the moment. There was no chance to have Michael do a take and then say, ‘Okay, and now we need you to go in the trailer and then re-enact the same thing you just did in isolation, or to do it in a completely different location some other time. This was just never going to work and it would not give us the best performance.”

Ralla came to Rising Sun Pictures knowing they had developed a toolset called REVIZE that uses machine learning techniques for face replacement. “Rising Sun visual effects supervisor Guido Wolter had sent through a spec sheet of what they needed in terms of capturing the actor. The most important thing was being able to do it there, in the moment. And that became the Halo rig.”

The Halo rig was a 10-camera rig on a ring that was shoulder-worn. “We made it like that rather than being head-worn because we wanted Michael to still be able to fully articulate and move his head around,” says Ralla. “But we also wanted to shoot him from as many angles as possible. It was to give Rising Sun an abundance of training material to use as a dataset for the REVIZE workflow.”

A company called Wild Rabbit Aerial built the Halo rig. Interestingly, they are known for drone work for films, but they also had experience with camera arrays, which is why Ralla went with them. “They built this carbon fiber ring and the harness, which was very light. It needed to be nimble, and we needed to be able to do this really fast, because that was a key aspect to making the performance successful. The Halo rig was built prior to the Pepsi challenge, and used during that test shoot.”

The cameras in the Halo rig were Insta360 Ace Pros, which featured 1/1.3-inch sensors paired with Leica-designed 16mm f/2.6 lenses. “They shoot 8K with a modified firmware that also came from Wild Rabbit that allowed us to actually start them in sync, even though they were not genlocked,” advises Ralla. “We also found that they could alter the firmware to use a log color space.”

The close proximity of each department head on *Sinners* meant that Ralla could quickly ask his fellow filmmakers about how the Halo rig might impact their own needs. “Michael would come in,” shares costume designer Ruth Carter, “and say, ‘We have this idea for a Halo rig. Do you have a replica of the costume? Do you have a mannequin we can borrow?’ They’d be part of the costume fitting to understand the costume a lot better and to test the rig. We could really rally behind each other's ideas, we could support each other in so many small ways.”

The Halo rig data was accompanied by a process Ralla referred to as the ‘Foxtrot’ where Jordan was placed next to a body double and the pair would go through a series of head

< Jordan crafted unique voices, demeanors and emotional differences to help tell Smoke and Stack apart.

positions and expressions. “It was like a simplified FACS set, turning their heads and saying the same lines. That was shot on film and, again, on location, on set, in the accurate lighting, right after the take. We would finish the A-side, then we'd do a Foxtrot and a Halo. Then we’d finish the B-side, and do a Foxtrot and a Halo for both the double as well as Michael.”

In its reference gathering exercise, Rising Sun Pictures also received traditional photogrammetry-style scans of Jordan used to build a digital double. Finally, a controlled shoot off-set was undertaken of Jordan using standard full-frame digital cameras. The idea here was to acquire high-fidelity data of the actor and his doubles beyond the captured dataset.

Rising Sun’s REVIZE workflow was then utilized. “Leveraging our machine learning capabilities,” states Wolter, “the team employed novel-view-synthesis—-a gaussian-avatar style approach—to create and reproduce angles of our hero as needed. Similar to the diverse range of techniques used during principal photography, we also employed a combination of machine learning, CG and advanced compositing methods to convincingly portray Smoke and Stack together on screen.”

The resulting twinning shots from the test—a splitscreen and a machine learning-based digital face replacement—were both deemed successful, while also helping the VFX team determine how these kinds of shots should be done for the whole film, depending on the action. “It confirmed exactly what we were saying,” points out Ralla, “that the body language of Michael mattered so much that you could tell when we just put Michael's head on the double, in that it wasn't in line with all the other performances. So, anytime we saw more than just shoulders, or anytime we saw Michael, especially standing still and not interacting, we would shoot him twice, no matter how hard it was. Just because we knew the body double hadn't gone through the same development and training process, developing Smoke and Stack's body language, and it was key to making all this successful.”

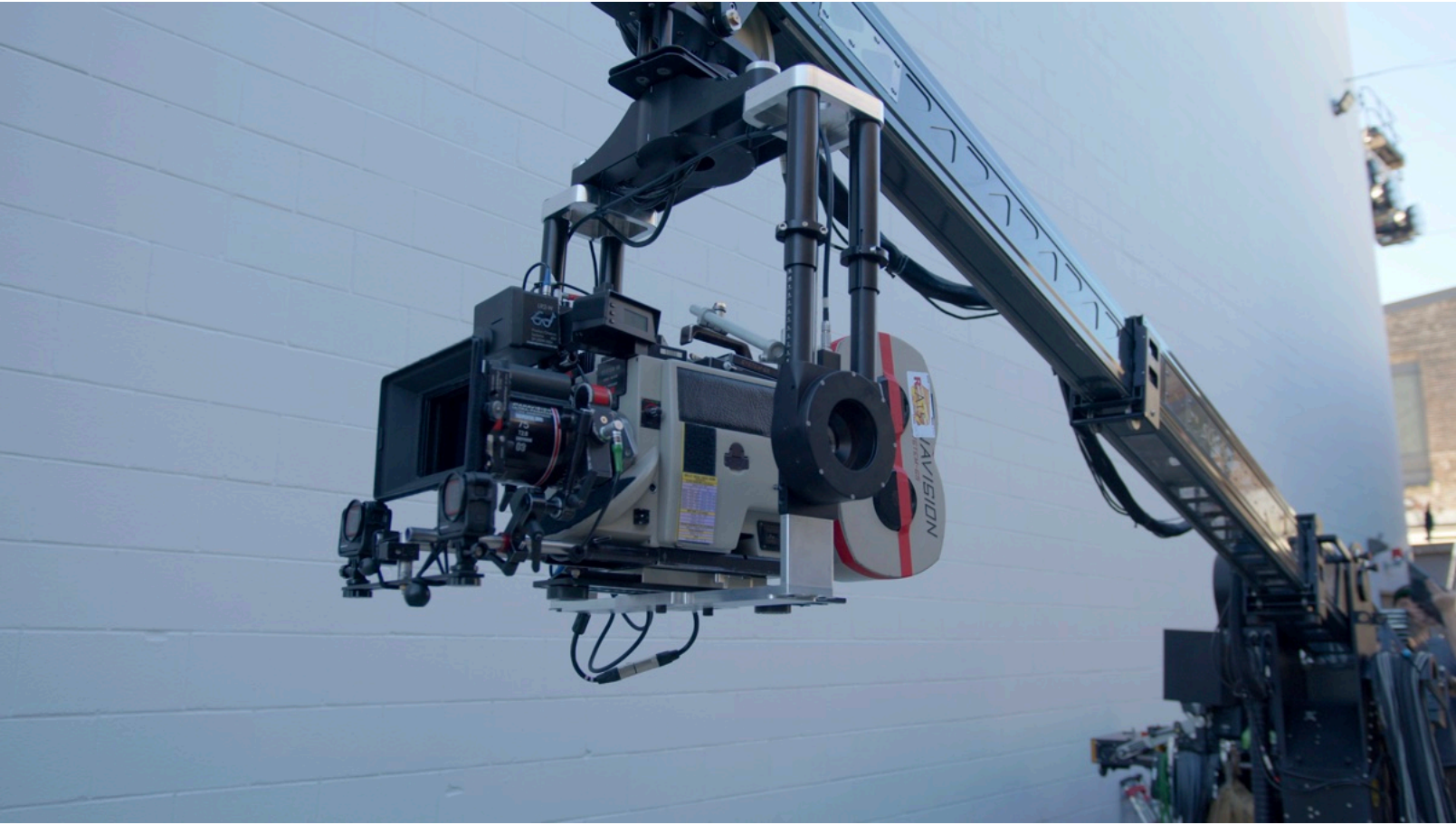
“The other thing that we learned from this Pepsi challenge,” continues Ralla, “was that a face replacement, in most cases, wasn't enough. Because Michael is a director himself—and he's directed himself too—he knows what he looks like from behind, and he knows what his ears look like, which not a lot of normal people do, I mean, I certainly wouldn't. So the first time he saw a face replacement, he was like, ‘Those are not my ears, that's not my hairline.’ He could see it was the body double. So, sometimes Rising Sun had to do a full head replacement, including the hairlines and sometimes even full hair.”

There’s more on Rising Sun Pictures’ twinning shots, below. But first, a look at how the final cigarette swap shot appearing in the film was achieved. It ultimately became a 1350 frame visual effects shot with a wealth of interaction, as Smoke and Stack hand the cigarette back and forth to each other.

The Technodolly was employed for the various passes involved, essentially an A-side with Jordan as one of the brothers, and then B-side as the other brother. A carbon fiber rod positioned on the car the pair lean up against was used as a spatial marker for where the hand-off could occur each time.

What the Technodolly enabled was precise repeatable moves, as Tatham explains. “We would hit record for the A-side, and whatever was filmed—whether it was a pan, tilt,

> Visual effects supervisor Michael Ralla reviews a take with Jordan on set. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


JAVISION

zoom telescope, push in on the track, boom—the Technodolly remembers everything. Then we put it back in playback mode and run through the B-side."

"Here, we had audio beats on the B-side," adds Tatham. "We had a QTAKE system as well. That gave us a 50-50 gradient with the hero take. In real-time, we could see Michael A and Michael B as a live comp and see if they were interfering with each other and where they lined up. You could see, oh, he was a little fast, he was a little slow, he leaned a little bit to the left. On the B-side, too, not only did we have audio in sync with us as we were playing through the move, but we also had a way of triggering the QTAKE to have a live overlay."

The QTAKE video playback system was overseen by video assist operator Dan Furst, who implemented a GPIO (General-Purpose Input/Output) pin trigger to aid in coordinating the Technodolly moves, video playback and sound playback. "It's an essential piece of the puzzle when it comes to making everything go," outlines Furst. "It connects to QTAKE through a USB. I would put a point for a GPIO trigger in the timeline, and when you play past that point, you can tell it which triggers to activate. It ran to the Technodolly and to the sound department and it would trigger their individual boxes. When you're shooting film, especially large format, timing was important. You really can't waste any time on the film."

"For the A-side take on the cigarette swap," continues Furst, "we would roll sound and then we would have the slate ready with the bloop slate that would trigger everything, then they would hit the clapper sticks, have the bloop slate right away, and then playback would start. When the bloop slate would go the first time, it's just a recording for me. But when we would do it the second time for the B-side half of the twins, I'd have then queued up the bloop slate in QTAKE point for the GPIO trigger and the sound department."

Meanwhile, audio beats implemented for Jordan were orchestrated by production sound mixer Chris Welcker. "We had been thinking about how to help get the timing right when they were shooting these shots," shares Welcker. "We figured, Michael B. Jordan was familiar with ADR and the series of beeps used to cue them as to when to start delivering their dialogue. So we thought, maybe we could create a series of beeps that could alert him to when the timing of the hand-off should happen and give him the ability to preempt that timing by giving three beeps before the fourth one, which is when the hand-off has to happen."

Using a Pro Tools set-up on location, Welcker looked to integrate these beeps with Furst's video playback system. "Dan was essentially recording a bloop slate. He would physically press a button and it would trigger a light for the start of the camera move. His system then sent out that GPIO pulse which meant we could sync up to his system. We had to figure out a way to take that pulse and convert it into something that could be interpreted by the Pro Tools system as essentially starting our playback system."

In addition, Welcker was able to take the recording of what Jordan and the double had said on the first A-side, and play those back on the B-side. "That opened up a whole can of worms, because now we were essentially having to not only record the dialogue, but we would also have to edit that first performance where we were using the Technodolly and we would have to essentially cut out anytime his stand-in Percy speaks, to make space for Michael to do his thing."

< The Technodolly proved to be a key piece of camera tech employed during shooting of splitscreen twinning scenes, owing to its ability to stage precise repeatable moves.

"It took about 25 to 30 minutes for Michael to leave and to come back as the other twin," adds Welcker. "We had to take the mic off him. Then he would go to hair and make-up, then wardrobe, and come back as the new twin. We'd have to put a new mic on him. When he would come to get his mic, he'd be there standing next to our system and we would say, 'OK, this is what we came up with, and we could maybe audition with him some of that playback just so he could kind of hear himself and get prepared."

The cigarette swap shot took 18 takes to master. The video tap and telecine'd transfers would go to editor Michael Shawver. "I lined it up and I watched it," Shawver says. "Michael is such an incredible actor and he brought it on both sides. I'd never seen him so locked in. Each take would have a little bit of different nuance to it. Part of what I do is, when I take it in and I do a quick comp of those shots, and then watch it back, I put myself in the mode of an audience member. And sometimes, it's just how it all feels. In this instance, we ended up switching out one of the takes to the one they shot to. As long as that point of connection with the cigarette was lined up—basically the move had to stay the move because the camera obviously couldn't look weird and separating—but once we got into that shot, I could then manipulate one side or the other as necessary."

The other tricky part about that opening cigarette shot, from Shawver's perspective, was establishing some momentum at that point in the film. "You really want to balance getting the story going, while also showing this spectacle with the twins. But we don't want to overstay our welcome. You want to have it so the audience says, 'Oh, OK, I can see that. If the audience starts to think for themselves, not when you want them to think for themselves in later parts of the movie, then that can be a bad thing and it can start to unravel. You don't want the audience to be thinking about the effect. So, we found in the final cut a way to cut back and forth to show an empty road, to communicate that they're waiting for somebody."

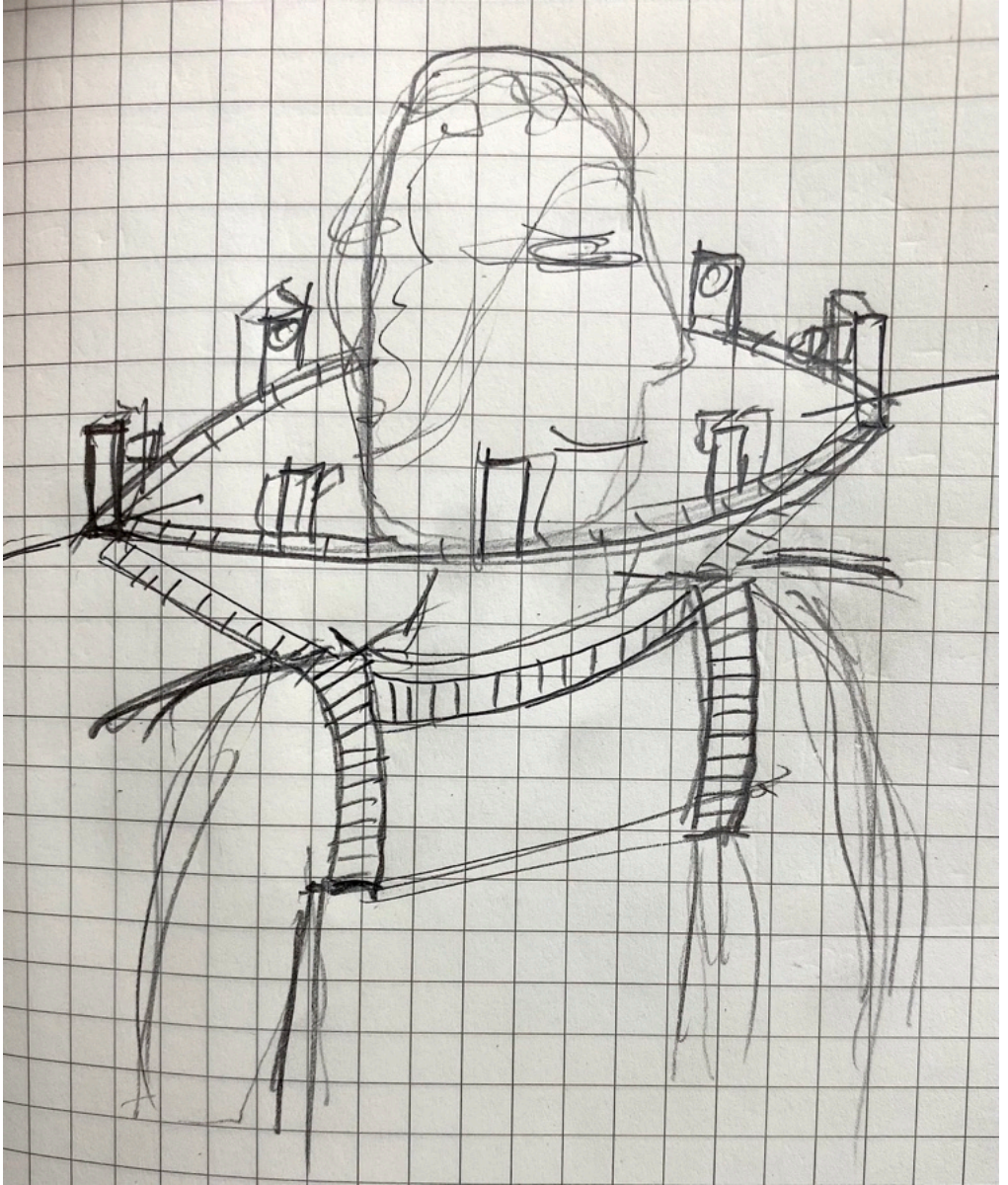
Storm Studios then took on compositing the final cigarette swap shot. The studio had to break down each handover of the cigarette, each exhale of smoke, including where the takes might not quite line up and where the lighting changed between takes. These would be solved with re-times, warping, reconstructing the plate, and morphing.

Four compositors from Storm worked on the shot, splitting between the three cigarette handovers, and then the clean plate and paint-out work. "We set aside three or four weeks of comp time to do this," mentions Storm Studios visual effects supervisor Espen Nordahl. "We started with some mock-ups firstly just using the telecine QuickTimes. Then once we got the scanned plates, we had multiple takes, so we would start to digging in to see how we could use them. They were all similar enough that we could use an arm from one take, the legs from another. We had to reconstruct the cigarette itself, because the angle was different in each handover."

In terms of the cigarette smoke, there was exhale each time, ie. smoke in the plates. "That was a challenge because sometimes the wind was blowing in the opposite direction from the other take of Michael," observes Nordahl. "In the end we did remove almost all the practical cigarette smoke, and then did a smoke sim in Houdini. There was a clean plate for the background, which worked great for any smoke that wasn't on top of Smoke or Stack. Then everything on the face, sometimes we'd just paint out on key frames and morph between them, then put our smoke on top."

Twinning visual effects was also necessary for some driving

> The Technodolly in action. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.



sequences featuring both Smoke and Stack travelling through cotton field roads. In one scene, the twins are shown sitting in the front seats of the car, with Sammie (Miles Caton) in the back. “It got challenging because Smoke is driving,” notes Ralla. “In fact, whenever they're together, he's always driving. But how do you do that when we're replacing them? So that’s where we shot with a tennis ball on a process trailer.”

The overall process consisted of first shooting Jordan as Smoke, who would be driving for real in a real car, with a hard-mounted camera. When the camera was then placed on the other side—for the Stack side of the shot—the action moved to a process trailer, where the car would be loaded onto the back of a truck, slightly elevated (the horizon line would be fixed later, alongside the generation of the correct backgrounds). The tennis ball came in to minimize occlusions.

“What we settled on was recording the A-side with Michael as Smoke, and Percy there as the double for Stack,” explains Ralla. “Then the sound department—who were following along in a moving van while doing all of this—scrubbed the double’s answers so that Michael could speak them on the B-side. Then the double would re-create Michael’s, or Smoke’s, lines for the shooting of the B-side.”

The hard-mounted camera brought with it its own challenges in terms of compositing the two takes together, owing to vibrations and small differences between the plates. “We actually had Storm Studios explore techniques to remove motion blur with CopyCat in Nuke, which was doable to some degree,” advises Ralla. “But what was really interesting was that the vibrations would sell the authenticity of those shots. Where we landed was that we combined the vibration from both sides and that would become the plate vibration. We analyzed the vibration from both plates, sometimes the spikes were exactly the same, at the same time. If they weren't, then we would add the vibration from the other side.”

For other twinning shots where Jordan might be finding that his performance sometimes wouldn't fit in the time that was allotted based on Percy's performance, Welcker’s team had to pivot quickly. “We started exploring pre-recording Michael’s dialogue for the twin that he would eventually play in the second setup. My music playback operator Ryan Ferris would literally trigger pads on a sampler, a drum machine essentially, and we would have the lines of dialogue from Michael pre-recorded and broken down onto these different buttons. And so, he would essentially perform against himself while Percy there, but not actually speaking. To add even more complication to that, there were those times where they wanted to do all these things while we were also in a car driving, doing this wirelessly with earwigs in the actor's ears! We sometimes had a dialogue editor in a van putting together these performances and playing it back through my system all while driving wirelessly through separate vehicles. It got pretty complicated, but by the time we were done, it was like, man, what can't we do?”

At the climax of the film, Smoke fights Stack, who has been turned into a vampire. This, of course, required the action to appear as if Michael B. Jordan was fighting against himself. Stunt coordinator Andy Gill was called upon to choreograph a unique fight between the brothers.

“We're going back to the 1930s, and so right off the bat I

< An initial sketch of the Halo rig, worn by Jordan and a range of stand-in performers, as a capture device. It was imagined as a shoulder-worn capture system with a 360° camera array used to gather a comprehensive lighting and performance dataset during principal photography.

started talking to Ryan about how both the brothers went to World War I together," recounts Gill. "I looked up how people trained in World War I, and it was basically grappling, wrestling and boxing. It was not going to be a martial arts-type fight that you might see today. Tim Bell was the local stunt coordinator who came in and helped with a really great team. One guy was a wrestler, one guy was a boxer. What we like to do is put together what we call a select list where we'll videotape 10 or 15 different moves and show them to Ryan. We finally cut it down to put in the moves that he likes into the fight, and then we also would do a stuntvis version. I'm used to big wire pulls and big fight scenes, but I had to tone it down and make it a realistic period piece."

Gill then worked with Jordan to train and learn the fight. The actor was, unsurprisingly, busy with shooting scenes, but anytime he was available on the stages, he would visit Gill in a warm-up area so they could teach him the fight. "He learned so quick," marvels Gill. "The only reason it really worked was because of the dedication he had to it and the input he had. A lot of times we would be doing something and he goes, 'Let me think about this.' Sometimes we would have one brother just trying to kill the other brother. Michael would say, 'I've been having this talk with Ryan. He goes, we're brothers. Even though he's a vampire, he is still a brother. I don't think he would just outright kill me if he had the chance to, right off the bat. He's going to think twice about it.' So we put a few of those pauses in there."

Jordan performed the fight against his stunt double Devante Antonio Thomas. "Devante mimicked Michael B.'s movements as much as he could," relates Gill. "Michael B. would have to fight the double and then we'd switch, and then he would be fighting a double again, but as the other twin. That meant he had to learn two different fights, two sides of the fight, which is huge. He knew the moves from the first half, so he knew how to react to them."

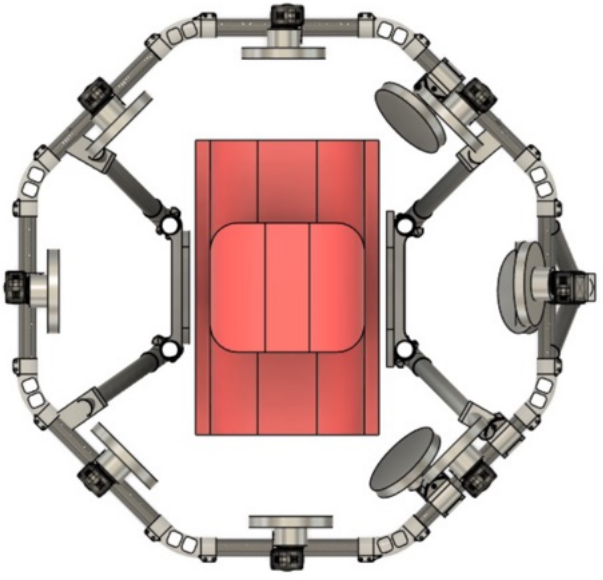
Gill was particularly impressed with how Jordan adjusted his performance depending on whether he was doing the Smoke side or the Stack side. "The way he changed over, not just via wardrobe, but his attitude, I mean, if he had been naked you could tell which one was which! Just the way he held himself, just the way one hunched over a little more. One was rigid and straight up, one had a little swagger. Every time he walked in, I know exactly who it was. It was phenomenal."

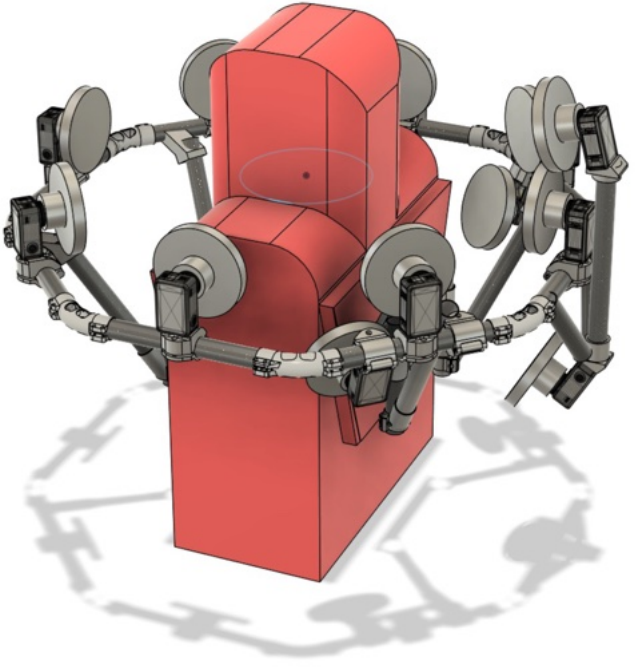
In addition to these changeovers (which occurred with the stunt double as well), Jordan would go through a round of shooting with the Halo rig. "Michael B. would do a fight and then once he does the fight, before he went to the other side, they put the Halor rig on him and he did all these movements," explains Gill. "Then they put that same thing on the double and he would go through the movements."

Rising Sun Pictures then handled the twinning work for the Smoke vs. Stack fight. By its very nature, it included a range of close-combat where the original plate would be Michael B. and Devante, and then need to be finished with two lots of Michael B. Jordan in the frame in close-combat.

For these fighting moments, the general approach was for Rising Sun to replace Devante's head with Jordan's using their REVIZE workflow. However, Rising Sun also completed some body alterations, simply because Devante had larger biceps and deltoids. Having purpose-captured models of Jordan as both twins, and of the stunt double, meant that the visual effects studio could complete these kinds of augmentations. "They would always start with a

> The Halo rig was made up of an array of Insta360 Ace Pro cameras capturing in 8K. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.





rotomated version of the digi-double," outlines Ralla. "Then they would run their ML tech to turn the digi-face into Michael's face, but always using the performance from the Halo rig from Michael's performance, not the stuntie's performance.

The shots were incredibly complex, notes Rising Sun's Wolter. "The art of digital twinning is inherently binary. It either works seamlessly or it doesn't. That makes it both incredibly unforgiving and immensely rewarding when it works. Having Smoke and Stack physically engage—punching, grappling, grimacing, sweating and bleeding—introduced a dynamic layer of complexity. Each shot presented a unique challenge; there was no 'one-size-fits-all' solution.

Over the course of the film, Rising Sun Pictures would rely on its REVIZE workflow for a range of different shots, some as complex as the fights, some with minimal interaction, and even some where the usual Technodolly approach to filming had not been possible. The studio ultimately processed around 125,000 unique faces, a data set that totalled more than 52 terabytes of reference material. Importantly, while machine learning was at the heart of Rising Sun's work for their twinning shots, multiple techniques were used, and always with the goal of preserving Jordan's original performance.

"We approached the shots with the goal of seamlessly switching between techniques," states Wolter, "whether in-camera, CG, machine learning or compositing, so the audience could stay immersed in the moment without detecting the illusion. This work demanded everything from our toolkit and we believe the end result is a compelling blend of skill and technology. We'd like to believe you'd be hard pressed to find where our artistry begins and the illusion ends." **b&a**

< The Halo rig comprised a carbon-fibre shoulder harness with 10 cameras arranged in a circular ring around the actor's head. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

BRINGING THE VAMPIRES TO LIFE (AND DEATH)

Behind the practical and digital make-up effects.
By Ian Failes.

For *Sinner's* vampires, there would be various states of transformation the vampires would be shown in, from having just being bitten, to more engorged forms, and —especially in the case of Remmick (Jack O'Connell)— various states of burn and disintegration. Prosthetic make-up designer and special effects make-up designer Mike Fontaine was responsible for the film's vampire make-up effects. "Ryan asked me," recalls Fontaine, "'How could we make something like vampires that's been done so many times feel fresh? What's our take on it? What's our unique perspective on it?'"

A range of unique approaches came out of these questions. Eyes were an early consideration for Fontaine. Coogler was looking for a reflective quality in the vampires' eyes. "This is essentially what happens with nocturnal animals at night," says Fontaine. "The effect is called tapetum lucidum. Ryan asked me if there was a way that we could do this in-camera, that is, actually have it in the actors' eyes and shoot for real."

Fontaine reached out to Cristina Patterson, a specialist for custom contact lenses for the film and television industries. "I asked her, 'I don't know if this is a crazy idea, but do you think there's any way something like this could be possible?' She said, 'It just so happens that I have been prototyping this and experimenting and working on this in secret now for quite some time and it's almost perfected, enough that I think we could do some tests.' Ryan was immediately excited about it."

Some tests on IMAX film were then shot with Michael B. Jordan and Hailee Steinfeld (who plays Mary) wearing these new contact lenses. Autumn Durald Arkapaw used the tests to experiment with how to shine light directly into the actors' eyes to achieve the desired bounce-back effect. "I think it created something that had a lot of depth," notes Fontaine. "Even the color choices for which character was going to have what color went a long way, and was very intentional."

"We couldn't put lenses in everyone's eyes all the time," advises Fontaine. "For one thing, a set of lenses took weeks to make, they were so specialized. Sometimes the actors were dancing at night or performing stunts or in the water. So in those cases, Michael Ralla and his VFX team came in. They scanned the lenses, and they were able to very accurately recreate that effect so that we could have consistency throughout the whole film."

In terms of the overall look of the vampires, Fontaine went with what he describes as a 'primal and animalistic' look, even referencing lions after they have eaten some prey, with blood on their faces. That led to a specific fang look, too, with the idea again being to differentiate these from previous vampire movies. "We actually made a database of vampire

< Prosthetic make-up designer and special effects make-up designer Mike Fontaine attends to Jack O'Connell as Remmick.

fangs that had been done before, and then I made a database of different animal teeth and how those shapes looked," advises Fontaine. "Then we created 3D digital models to try to test some of these ideas out. What we ended up with was a double fang that had a backward hook to it, almost like if you were to bite your prey, you would hook them in and they wouldn't be able to get out."

The fangs were sculpted in clay on casts taken of the actors' teeth. Here the intention was that the fangs would still allow the actor to speak and perform (and even sing) without interference. A further mouth-related effect was Stack's gold window cap on his teeth. "The idea there," says Fontaine, "was that when he turns into a vampire, the window remains, it's just that it reconforms into a fang shape, almost like the fang pushed the gold window out into a fang. It was actually 14 karat gold fit onto the top of our fangs."

Every character's fangs were designed a little differently. "For example," shares Fontaine, "Cornbread's (Omar Benson Miller) teeth are really shocking and extreme. They were actually inspired a little bit by Pennywise from *It* because there's a shot with Tim Curry that scared me so bad when I was a kid, when he jumps out at the beginning. I had said, 'I just want to do that in a movie.' So we knew we wanted that effect when he goes for his arm in the doorway."

For wounds, Fontaine engaged concept artist Carlos Huante to flesh out designs. "He's worked with visual effects artists, make-up artists, and he designed the aliens in *Arrival* and a lot of stuff in the *Men in Black* films. He goes right in with pencil and just starts sketching. We would have these long conversations and discuss the possibilities, and then he would send me these sketches which then became the strong foundation for where our clay maquette sculptures jumped off of."

Those clay maquettes sometimes utilized 3D molds and prints of the actors' heads as a starting point. "It was a nice combination between new tech and old tech," suggests Fontaine. "I personally love designing things in clay with my hands. I feel like I just have a very direct line to my creativity doing that. I always had a wall full of Carlos' drawings, pictures from nature and pictures of animals, and then I would start pulling from those things and trying different things out."

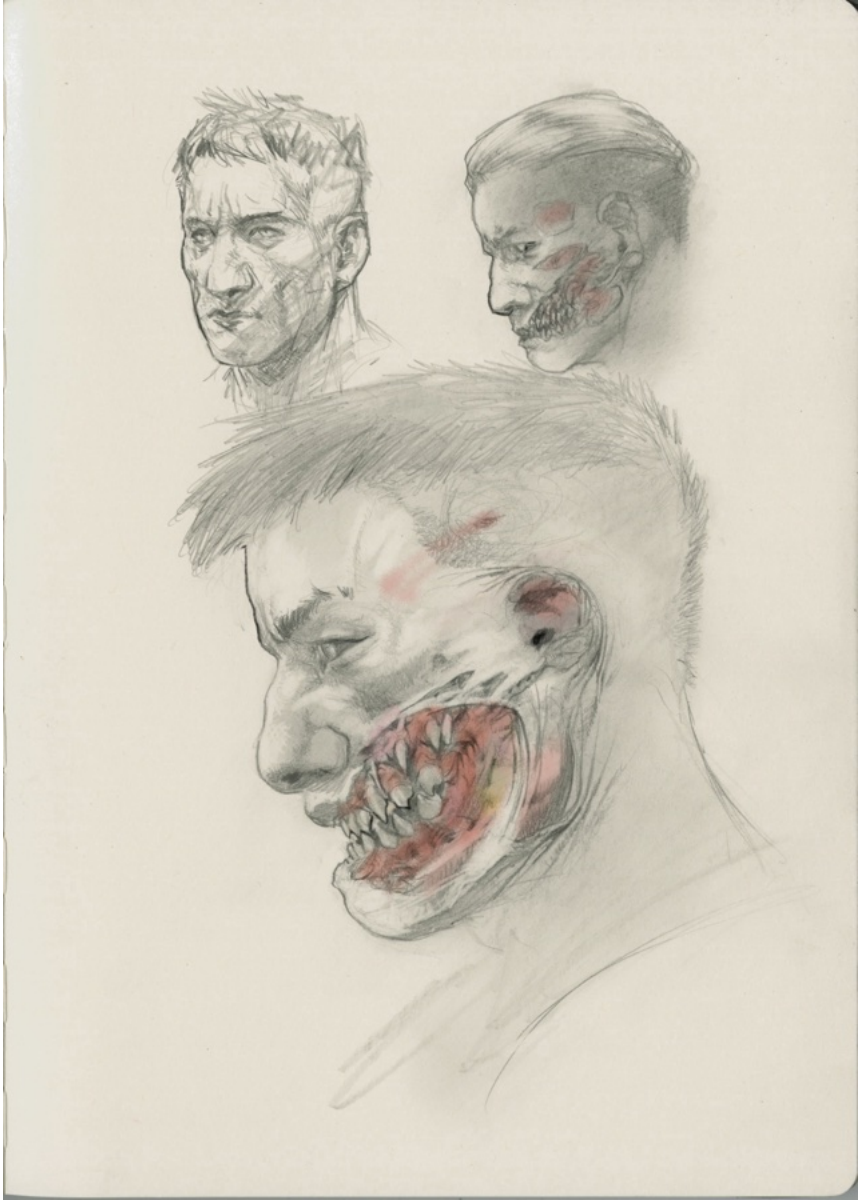
At one point, Cornbread receives a massive gunshot wound to his jaw, leaving much of the jaw missing and bloody mouth parts hanging to the side. A challenge for Fontaine was the additive side of make-up effects. "That's a big limitation—you can't really take away anything from an actor's face. Ryan really wanted it to seem like his entire jaw was blown off after being shot at very close range. I wanted to try to push it as far as we possibly could practically, even if there eventually would be a visual effects element."

"So," continues Fontaine, "I looked at some reference photos of gunshot wounds that were really disturbing to see, and I noticed that without the jaw to support, a lot of times the tongue would just flop down. So I used the tongue as a way to disguise his jaw and then built his face forward so

> To give a distinctive reflective quality in the vampires' eyes, the actors wore specially designed contact lenses, which VFX also had to, at times, replicate.

>> Clay maquettes made up for Cornbread's massive mouth wound.

>>> Cornbread's (Omar Benson Miller) vampire fangs and final gunshot wound prosthetics.



that it gave this illusion that he was actually missing part of his face. It was about creating the effect of negative space when there actually isn't negative space."

The prosthetics for that effect were made of silicone because of its translucent qualities and owing to the way it moves like flesh. Says Fontaine: "You can create a really seamless transition into the skin where it's very difficult to tell where it begins and ends. To get there, once we have the clay sculptures, we generate molds that are made out of an epoxy, which is a really strong, lightweight material that gets you high detail. The final sculptures are transferred to those molds, and then silicone is poured into those molds to make the eventual appliance that will get glued to the actor's face. We also had blood tubing implemented so that when he lifts his head in the film, you just see all this blood pour down. It's super gory even though it's not completely medically accurate. There's always some element that I want to add that's a little fantastical that's pushed a little beyond reality."

Later, Sammie is heavily clawed in the face by Remmick. For that, Fontaine sculpted the wound with something very close to his own self—his hand. "I had a life cast of Miles as Sammie in plaster sitting on the table, and I was trying to sculpt these scars into his face from these claw marks. I kept trying and it just wasn't looking right. So I eventually just sculpted a normal cheek on him in clay and then walked across the room and came back up to him and swiped it across with my own hands, using my fingernails to very violently do it. It was pretty much in one shot! I looked at it and I was like, 'Okay, well that makes sense and that has the energy of a real claw mark.' Then it was just a matter of refining the sculpture and making it more detailed. That's what we ended up using."

When things get much more brutal with the vampires in the juke joint, the non-vampires resort to stabbing their adversaries with wooden stakes. The result is a lot of blood. "For the blood spurts," discusses Fontaine, "we created these rigs that were glued onto the actors. Sometimes they were under prosthetics, sometimes they were under clothing, and they were connected to tubing that went off-camera. A lot of times it would run down the actor's leg, and that was connected to a tank with someone pumping it off camera."

"The fun thing about all that is you're shooting it literally on film and all the actors are there, and you have the timing of this moment," adds Fontaine. "It has to happen in that exact moment, and it just gets very exciting. There's a feeling of this pressure that comes on because it's a big reset once you soak everyone in blood, so it has to work. The actors are nervous. We're nervous. Everyone is there. Everyone is so hyper-focused, and yet it's chaos because when it explodes, it goes everywhere. Some people are covered in plastic hoods, like hazmat suits, with their goggles and their gloves and everything and hiding behind chairs. And it always goes completely where you don't expect it and nails someone in totally not the area where you would think that it would be."

Fontaine once again worked in conjunction with visual effects to develop a blood and wound bluescreen board for blood spurt-related scenes. "It had a bite wound, a bullet wound and a stake on it, and we were able to put it on a stand and spray blood out of each one on camera so that they could have reference and potentially be able to comp it into a shot."

Similar reference was acquired via a board of bubbling skin blisters. "We built a board with prosthetics on top of it," outlines Fontaine. "We did it larger than what it actually would be to scale in real life, and it was filled with tubes and bulbs, and we had all of us underneath puppeteering it.

< Concept for Remmick's significant jaw injury.

Specifically it was built by special make-up effects artist Kevin Wasner. I was very lucky to have him on the ground with me because every day I would go to Kevin and say, 'Crazy idea…'. And he would go, 'Let's make it.' For the blister board, within a few minutes he'd be sawing, drilling and pulling out tubes and connecting it to wire. The next thing I knew he would have this bubbling blister board that really rippled, almost like boiling water. It was so cool. It was scanned and photographed and became part of the DNA of what it looks like when a vampire burns."

The make-up effects for Remmick were some of Fontaine's principal challenges on *Sinners*. We first see the character stumbling to a remote household, covered in third-degree burns. "I was looking at all these medical references on medical websites and seeing real burns. I just thought, 'This is going to take hours and hours of airbrushing to replicate this on someone's body. We're going to have to do multiple days of shooting to keep that consistent.' I was worried it wouldn't be realistic. So we came up with this idea to just print those actual photos on temporary tattoo paper, the kind of tattoo that you would stick on and wet and peel off. We used a little Photoshop to blend out the edges and take out any elements we didn't want and then we created an assortment of them. It got us pretty far along the way, and then it was a matter of tying the rest of it in and layering it with some prosthetics."

"We also wanted his skin to be blistering and bubbling and smoking," continues Fontaine. "Again, that's where Michael Ralla and his team came in and they were able to enhance it and actually create those active elements so that when he's running towards the house, you see his skin sizzle, which was beyond what we could do practically. That was a really fun collaboration between our departments."

After the juke joint melee, Sammie manages to smash his guitar over Remmick's head. It results in the guitar's resonator being embedded in Remmick's skull. "Ryan wanted Remmick to be able to grab the disk and rip it out of his own head," details Fontaine. "On top of that, he wanted it to rip open the side of his face and expose that his molars are actually fangs, which was an idea that I loved. I knew right away that would be my favorite make-up in the film."

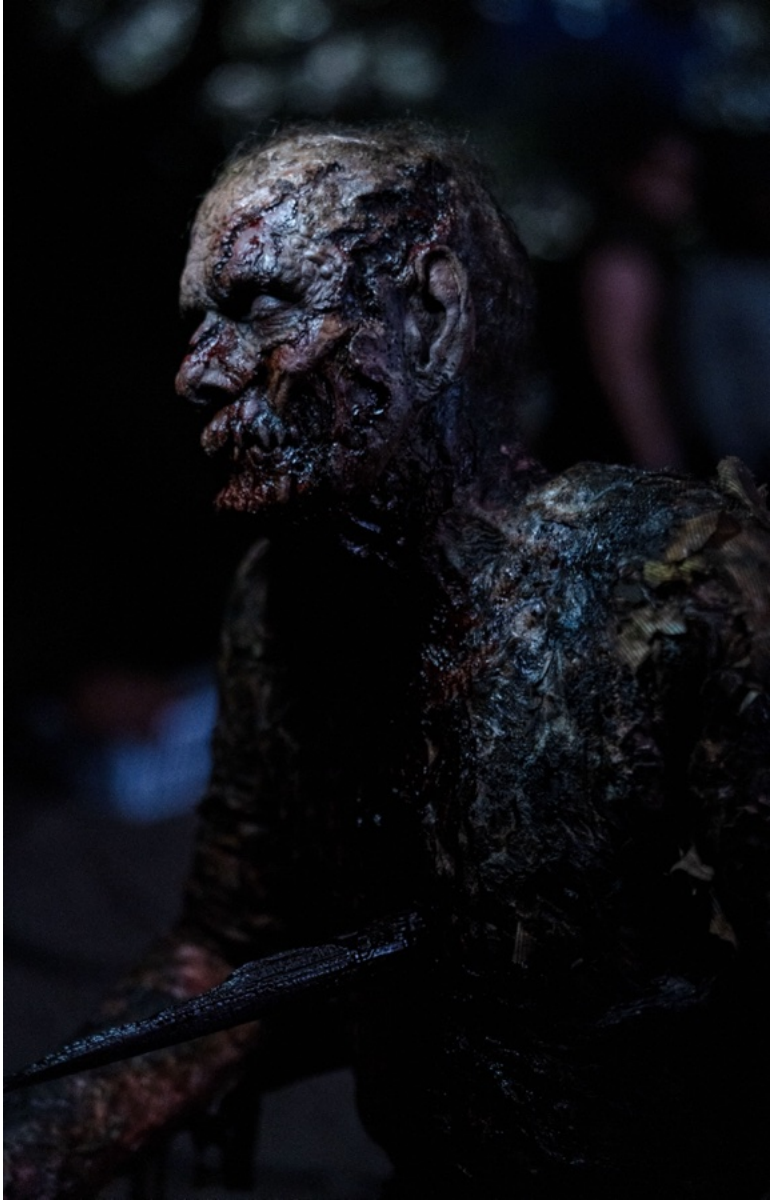
The approach to this effect became more mechanical than the other make-up effects pieces. "I ended up calling that our *Terminator* make-up because underneath it was this whole mechanical thing that was covered by flesh," says Fontaine. "We used a lightweight prop resonator made by the props department that we then molded and made into a super lightweight fiberglass version that was painted to look like chrome. It was mounted to a fiberglass plate that went on Jack O'Connell's head. Then that was covered by a wig and prosthetics, and it was attached with magnets. We also had tubing go up and down with smoke and blood."

"We had already discussed the shot with Michael Ralla and his VFX team as well," notes Fontaine. "So that when Remmick pulls the resonator out, we were going to have that missing piece of the resonator filled in with VFX, which meant it could be a seamless single shot. It all had to take place while the actor was in a pool of water during sunrise,

> Remmick clay sculpt on a bust of O'Connell and final make-up effects. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> Remmick's more burnt vampire form sculpted directly in clay. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Fontaine's burn double for Remmick. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.



which was quite a challenge but ended up being a lot of fun."

The coming of sunrise causes Remmick, and the other vampires, to be incinerated by the light. Remmick's throes of death included several stages of bubbling and burning, which Fontaine knew he would not be able to achieve via practical effects alone. "What we created instead was a lot of reference for VFX. One thing was a burnt head that was solely for visual effects to scan. We also built an entire burned body suit for the advanced burning stage of Remmick's death. That was placed on a body double, because we knew we didn't have time to do Remmick's make-up and the extra body suit while filming. And then VFX created a totally seamless transition between Jack and this advanced burn body double, and then to another stunt double that they actually lit on fire—for that we made a fireproof effects suit."

Of course, in carrying out the make-up effects work for Remmick and other vampires, Fontaine worked closely with costume designer Ruth Carter. "We would discuss with the costume department what stages of the clothes were going to be burned to what degree," states Fontaine. "They then had to prep all of these different versions of Jack's costume very, very specifically. I remember the costume department came to me one day and said, 'That burning skin that you're making looks really cool. Could we have some of that so that we could actually graft that into some of the clothing?' So we shared some of that with them. And then I said, 'Could we have some pieces of your burned fabric so that I can integrate that into the suit?' So we were all just sharing, and it was fun."

Carter mentions that she enjoyed that collaborative process with Fontaine and his team. "It's very important that we not live in two separate worlds. Sometimes the blood or substance needs to continue onto the costume itself. Make-up effects actually conducted some of their fittings in our fitting room. It was a fast shoot, and we needed to talk about and examine, 'What kind of blood are you using? What kind of substance are you using to make this gelatin effect on your prosthetics?' What chemicals are not good to use for your piece that would possibly destroy the clothing?' So, we really do know about each other."

Fontaine was particularly grateful, too, to be consulted with during the visual effects process when Storm Studios was completing shots involving Remmick, especially the burn scenes. "I was able to talk to Michael Ralla and Espen Nordahl from Storm and have this really fun, deep dive

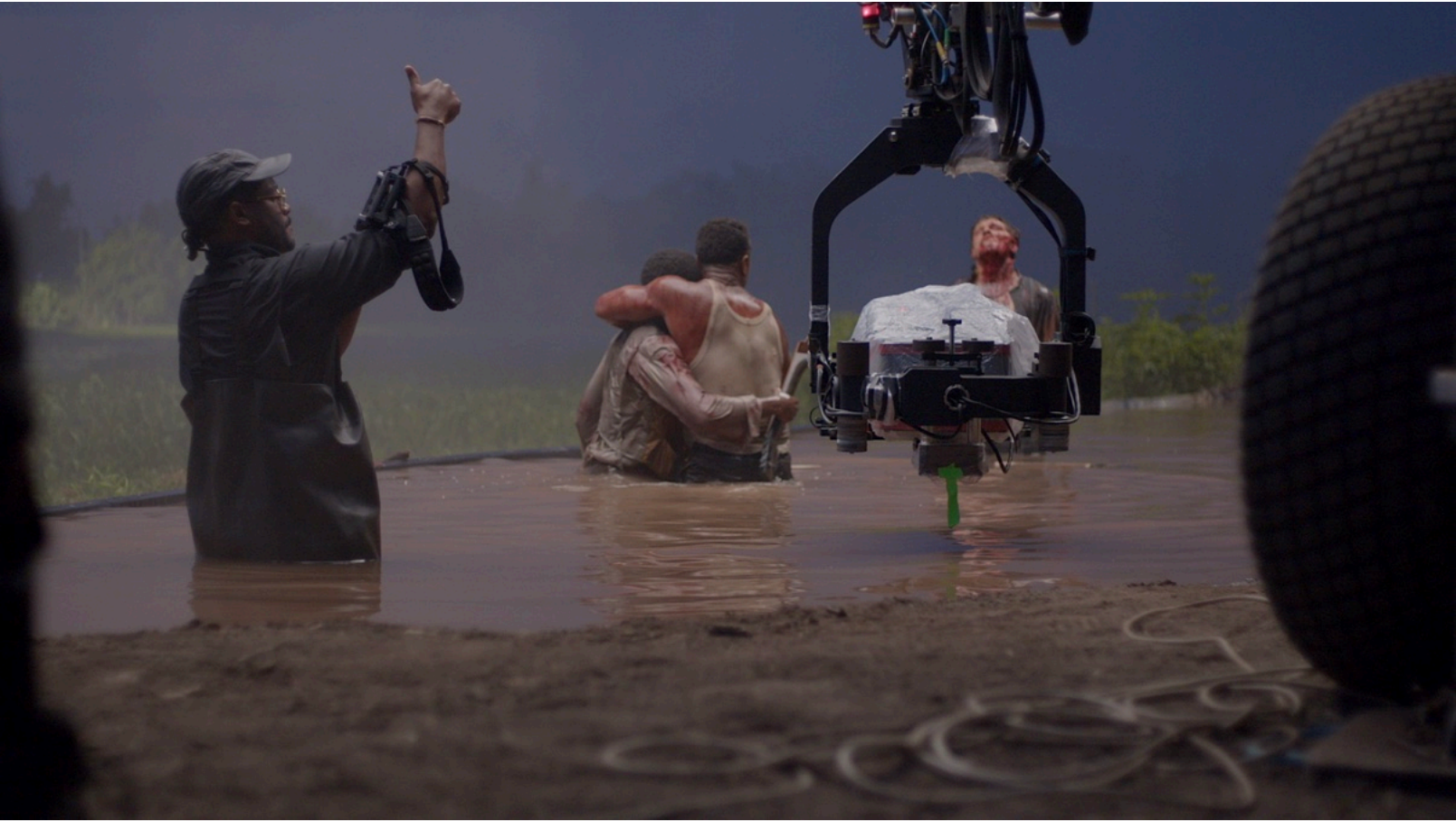
< A practical skin blister board devised to provide for practical effects reference. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

> A reference image of a river baptism Coogler provided to the heads of department for the demise of Remmick. Photo entitled 'Baptism in Triplett Creek, Rowan County, Kentucky, by Marion Post Wolcott, August 1940, as part of her work for the U.S. Farm Security Administration (FSA).

>> The practical photography for the final encounter with Remmick was filmed in a tank set-up next to the next to the levee in New Orleans. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Further views of the tank set-up next to the levee. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>> Concept art used to develop the look for the vampire tornado effect. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

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conversation that was very serious and technical, all about how a vampire burns. I'm so appreciative that Michael handled it that way and opened that door and made that possible for Espen and I, because he had questions for me and I had questions for him. We'd talk about the idea of lava breaking through Remmick's body like it was a crust. There were areas that I specifically sculpted that were meant to be channels where VFX eventually would add those lava breaks coming through. It was just so great to talk it through."

Knowing that visual effects would be supporting the practical make-up effects for the vampires with augmentations and additional CG, Ralla embarked on a major effort to survey and scan the various actors in costume and in prosthetics. Actor photogrammetry scanning was handled by Industrial Pixel. Visual effects data wrangler Taylor Kyles was also responsible for data acquisition relating to the vampires, and other visual effects components.

"We scanned everyone," declares Ralla, "in all their different iterations of costume and make-up. It became especially relevant because at some point it was clear that we wouldn't be able to shoot all of Mike Fontaine's prosthetic suits within the time that we had. So I told him, 'We're going to digitize everything that you've done and then we're going to be able to transition from one burn level to the next.' We didn't want to cut back and forth for those Remmick moments with all the progression happening while we're looking away. We needed to actually have an evolution of the bubbling and the blistering and the smoking and the glowing and all that happening in a shot, which we could do with these digital transitions."

"Also," says Ralla, "beyond just material scans and laser scans and cyberscans, I had a lot of conversations with Mike Fontaine and his team just trying to learn from them, how do you actually do this? What are the techniques that they're using? What are those materials? How does that work? How do you apply it? Because, even if you have material scans and even they tell you about how much specularity and roughness and reflectivity and all that, that doesn't necessarily mean that you understand the material. It still doesn't tell you if it's squishy or if it's solid. And I think that's really important to also wrap your head around."

For Remmick's burning, in particular, once an initial edit of the sequence had been made, Ralla decided to further concept the burn stages in an effort to establish just how visual effects might contribute to final shots. He had concept artist Chris Kessler concept different stages of Remmick's burn level for each of the takes that were in the edit. "We would start with just Remmick as he was shot, and then we would add cracks and blisters and then glowing, and then smoke and then flames. Then I would take the Avid edit and over-cut it with a blend that takes us from one burn level to the next one. Then I'd show it to Ryan to check. We did that for every single angle that was in the cut."

"Basically," adds Ralla, "I'd blend and blend and blend, and then sometimes I would go to editor Michael Shawver and say, 'This isn't enough time for us to show enough evolution to get to the next stage that we shot in-camera, could you

> Storm Studios augmented Remmick practical make-up effects with digital visual effects work, in particular for skin burning and bubbling. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>>> These before and after frames showcase the original plates, and final VFX shots by Storm Studios, including the water surrounding Remmick and sky replacements. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

give me three more seconds?' That was always the communication path that we would take—I'd go to Mike, talk through the edit, I'd get an export from him, and then give something back to him and say, 'How about this?'"

Storm Studios started its work on the Remmick burning sequence by building four of the different stages of Fontaine's practical make-up effects prosthetics digitally. "We started with ground truth," states Storm's Nordahl. "We made sure to build out those exact stages. Even though we wanted to merge some stages, and do slightly different stages on our end for visual effects than the specific ones they made on set, we still made sure to make a ground truth asset."

"We would take the scanned images of the actor wearing those different stages straight into Maya," adds Nordahl. "Then we started adding details, especially working on eyes, mouth, and nose, which were all a little noisy in the scan. We made sure all stages were using the same topology, the same UVs. This is especially important when we were going to morph between them later and do retargeting. Then we did before-after renders until you couldn't tell the difference between the CG assets and the one that was used for the scan. Every other frame is a new camera angle from the photogrammetry rig. You do those before-after renders until they all look as close to identical as possible."

Storm Studios worked in Maya, ZBrush and Mari, while using the photographs as textures as much as possible and snapping its base mesh to the scans. "Because we were morphing from one stage to another in animation, it was extremely important that all the edge loops lined up exactly where they should," remarks Nordahl. "You didn't want to have a knuckle all of a sudden sliding up the finger when it goes from stage four to stage five."

Rotomation of Jack O'Connell's original performance as Remmick was key to selling the mix of practical and digital, states Nordahl. "The whole goal was to use as much of the plate as possible. If we needed to, we could always project the plate back on top of our rotomation. That would give us our animation, but with a plate movement. Again, the idea was to use all the beautiful prosthetics in the plates. Where we had to, we would project key frames from the plates onto our animation and then morph between them, trying to get the best of both worlds."

For Remmick's skin boiling, bubbling and flaking, Storm Studios crafted Houdini effects simulations. "There were several setups," explores Nordahl. "There was a brute force sim for close-ups, where you see individual bubbles pop and burst, and skin melt and run down the cheeks.Then there was a more generic sim that was tiled. It was done in rest space so that we could slap it onto any shots as we were blocking out which parts would melt. Any time the skin was boiling, we would replace that whole particular section in CG. But we did of course look to the practical reference that Mike Fontaine made with the boiling skin."

Where Storm Studios had to deal with bubbling skin, they also had to introduce cloth simulations, as Nordahl explains. "The skin bubbling would propagate around itself, and that meant we would have to replace a large area around it as well. If we had a hard cut-off for only that area, it would look odd, because the areas around it needed to also be slightly melting and burning. So anywhere the bubbling was close to a costume, we would also want that costume to smoke, and sizzle, sometimes melt into the skin."

"The result," says Nordahl, "was that if we were only adding skin sizzling to the neck, we would often replace half the

< Storm Studios meticulously rotomated O'Connell's original performance, and then simulated a range of skin bubbling and burning FX.

face, and most of the shoulder and chest as well. That would build to replacing the shoulder part of a shirt, and from there we found it could be easier to just replace the whole shirt so you wouldn't have to have frame to frame continuity with wrinkles.Some shots were full CG—we would always animate, rotomate, light and render the whole character, and then comp could go in and use the parts that they wanted."

Remmick's death also occurs while the character is knee-deep in bayou water as the sun begins to rise (some views showcasing the sunrise were completely digital shots by Storm Studios produced in close consultation with Arkapaw). "We shot Remmick's death in a specially built tank of water right next to the levee in New Orleans,"

> From original plate to final shot: showcasing Storm Studios' layers of simulation for Remmick's demise. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> A practical burn effect for the moment Remmick ignites was created on the location. Storm Studios then crafted this digital element to match the practical reference. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>>> Special effects supervisor Donnie Dean devised a series of practical fire tornado effects, which would ultimately serve as useful reference for the VFX teams. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>>>>>>> Plate to final, including Storm Studios' CG tornado element and environment work. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

outlines James Alexander. "The reason is, there were some creatures around. I've got a great clip on my phone of panning around from my chair in the producer's tent and seeing a little alligator jumping off the bank right into the water right on cue."

As Remmick begins to burn, so too do the surrounding vampires. Storm Studios handled a number of these shots, with Light VFX also contributing a key burning vampire moment. "The director wanted to add an extra shot in the sequence of the vampires on fire," advises Light visual effects supervisor Antoine Moulineau. "We body tracked every single character—there was a lot of transformation and movement. All the fire and smoke was CG fire and smoke done with the Axiom solver, Houdini-based plugin."

Remmick eventually erupts into a mass of flames before turning into a fire vortex. "For the burning Remmick," states stunt coordinator Andy Gill, "we had a regular fire burn with a stunt guy in the water with a latex headpiece and hands. Then they changed him into another outfit, which was more like bare skin with much of the clothes burnt off. Now he had silicone hands with veins and muscle and everything else. His face was covered with a mask that was almost skeleton looking. We burned him, too."

The filmmakers sought out a practical solution for the vortex, turning to special effects supervisor Donnie Dean. "I had seen other films do fire tornadoes that involved a lot of fans and a lot of other equipment," Dean tells *befores & afters*. "Well, Ryan wanted something unique, so we had to come up with a mechanical way to produce a fire tornado in the water. That involved about three months of testing. We started out with propane valves and plumbing that had a coupler on it that would spin, and then we went to a chain drive because everything got too hot—it started melting components! We wound up manufacturing a huge turbine and plumbing propane into the middle of the turbine, and




then added a very large industrial size fan, which fed the turbine and pushed the air around and made a huge tornado. It went about 50 or 60 feet high when we shot it."

Like many aspects of the make-up or practical effects, the visual effects team was able to take a range of practical stunt burn and flame reference, and the practical fire tornado, and incorporate that look and feel into its final visual effects shots for Remmick. "There were amazing stunt burns done on set," says Nordahl. "They were not even shot day for night. They're shot at night, so the exposure and the white balance and the light interaction, and how it reflects off the water and pings all the actual gunk and stuff that's on the water—it was so gorgeous. We decided to try to match the plates first, before applying the vortex."

With that vortex, Nordahl advises that his team built up a Houdini sim, again to match the practical reference and take it further. "The most challenging thing there was getting the timing right. We would just be using a force to push the fire along, but it would initially stretch features and it would make things softer. And because it's stretching features, it would also elongate them and make them larger. So we found we often had to then push more detail into the fire sims."

The other side of the work was the fact that Remmick's death occurs in water. "I think the audience probably doesn't realize they've been looking at digital water for about a 100 shots," points out Nordahl. "What was great was that they really did film in water and they got the actors restricted by water, and reacting to water, and being cold, and being wet. Our assumption was that we would use a lot of the plate water and extend it. In reality, there were a lot of reflected ripples that needed to be replaced. The plates were still incredible reference. It makes running VFX dailies quite straightforward, because you just wipe back and forth. There's so little guesswork." **b&a**

< & >> Practical burn reference for the vampire burns, followed by the original plate, and final shot by Storm Studios. Here, the team rotomated the live-action actors and then simulated the fire and smoke. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>>>>>> A series of before and after frames from the Remmick confrontation at the riverbank, featuring VFX by Storm Studios. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

SOLVING SNAKE BLOOD

The CG snake, and its practical blood aspect.
By Ian Failes.

In their efforts to bring together a range of musicians for their juke joint, Smoke and Stack collect Sammie and then retrieve a truck full of alcohol. They are surprised by the presence of a rattlesnake on the truck, but Smoke is able to confidently stab the reptile with a knife and kill it, perhaps foreshadowing the danger that is yet to come.

The snake was a digital creature realized by ILM. "One of the great things that they did was put a real rattlesnake on the back of the truck initially in the hope that it might work for the shots," details ILM visual effects supervisor Nick Marshall. "But, the rattlesnake would just meander around and sniff its way through. It didn't give them any of the aggressive performance that they needed, and obviously they can't try and push a live creature to give that. So while it was quickly obvious that they were going to have to take this over as a CG creature, we did have one really good plate that they had shot as a reference that we were able to then match to."

Somehow, a photogrammetry scan of the live-action snake was able to be carried out. "It just about stayed still enough for them to do that," says Marshall. "We were able to get proportions and some texture reference out of that, and then beyond that point, it just became about going in and doing very manual creature development work from there."

Michael Ralla had ILM institute its own Pepsi challenge in putting up a CG snake against the real thing. "We put up our asset in the shot, we posed it to match the plate, and we matched it so closely that no one could really tell the difference anymore between the CG and the practical," discusses Marshall. "We knew we'd nailed that once Michael showed a version to the director and to the DOP where they didn't know which one was which."

When Smoke stabs the snake, he also throws it into the grass where it writhers briefly, with blood slowly spurting out of its wound. "Ryan was very specific about the blood," shares Ralla. "He said, 'It needs to be pulsing, and then the pulsing goes slower, and it has to overflow.' That was a lot to achieve with a typical art-directed fluid simulation."

Indeed, ILM had been initially progressing with blood simulations for this moment based on physics. "The reality was," notes Marshall, "that our snake wound was a full sever right the way through the neck because of the way that the knife went straight the way through into the truck underneath. No matter what our FX team did, no matter how they tried to pose the snake and just tweak the

< The original plate and ILM's final shot of Smoke stabbing the rattlesnake in the truck. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

> A 'Pepsi challenge' test was implemented for the CG snake. A real snake is on top, with ILM's CG snake on the bottom. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> For the spurting blood from the dying snake, ILM visual effects supervisor Nick Marshall rigged up a practical blood pump in his backyard as an element shoot that could be composited into the shot. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

performance a little bit or just put in extra containers, they couldn't stop the blood just immediately draining out the bottom of the wound."

Marshall then decided to try a practical solution for the blood, at home. "I ran down to Canadian Tire and Home Depot to grab some supplies, which basically consisted of a pool noodle that represented a scale version of the snake that I then wrapped in bright green Bristol card that was bright enough green to be key-able. Then I made up my own fake blood and essentially cut a hole in the top of the pool noodle that matched up to the shot. Then I rigged up a blood pack underneath that to pump blood up through, so that it would spill over in the right kind of pulsing rate. This was all set up in my backyard for about five or six different takes. I then sent them to my compositor and said, 'Can you make anything work from this?'"

"The first version we tried, it worked!" remarks Marshall. "I had thought, even if this is a complete failure, if it gives us nothing else, it might just give us some reference for the timing and the way that the blood forms some surface tension that you see before it spills down the side of a neck. I figured it could be some reference for our FX team just to have one or two more cracks at it before we had to deliver the shot. I didn't have any idea that it was going to *completely* work, but it just was one of those little magical moments where we did a rough key, dropped it in and it solved the problem straight away."

Ralla recalls then showing Ryan Coogler the composited shot, and the director's reaction being, "'This is awesome. This is exactly what I had in mind.' Funnily enough, Nick didn't want to tell me how he did it originally, because he thought we would see that as cheating. Then, the day after it got approved, he said. 'Okay, I've got to confess, this is how we did it…'." **b&a**

> ILM's dying CG snake. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


LLMAN

BUILDING A TRAIN STATION

Many different departments collaborated on the station scene. ***By Ian Failes.***

Stack and Sammie, separate from Smoke, go on to a train station to recruit old town harmonica player Delta Slim (Delroy Lindo) for the juke joint, where they also run into Mary (Hailee Steinfeld), Stack's ex-girlfriend, and Pearline (Jayme Lawson), who Sammie soon falls for. This sequence was shot on a partial set that was extended with railway and town buildings, plus an arriving train, by ILM.

Production first looked to any physical locations where an existing train and train station could be filmed, including in New Orleans, Tennessee and Texas. A former station building in Clarksdale, Mississippi was chosen as a key reference. "The actual Clarksdale passenger train station is now a blues museum," outlines production designer Hannah Beachler. "We looked at where that was placed in the city and how it divided the city. That's what we wanted to also see in our train station. You would have buildings on the right and buildings on the left, and then in the middle of that is the train station, which made it a lot more intimate and accessible to both black and white people at the time. It also signified a little bit of how blues traveled—this is how blues got across the country."

In designs for the train station both in pre-production and when visual effects shots were being worked on, Beachler looked to employ some very deliberate 'cross' imagery with the tracks that echoed other cross scenes in the church and the juke joint. "If you look at the big tall wide shot of the train station, you'll see it in the train tracks, which was something we did in post. I pitched that to Ryan and talked to Michael Ralla about it. I think that's the difference between having the designer on through post, which meant we could add that in as a piece of design language. That X really talked about good and evil in a way."

The train was another key design aspect. A particular green Pullman passenger train was imagined, with reference gathered from old photos and footage. There was also the initial desire to film with a real train, but the logistics and costs of doing so meant that ILM would eventually build a digital one. ILM would then build a digital train directly based off of a locomotive that was stationed at a museum, where it was scanned.

Virtual scouting techniques were utilized to nail down the final look and feel of the train station. "We sent a location scout to five or six different stations and had them fly a drone around the station at three different heights and then walk around it on ground level," describes Rall. "We then ran that footage through RealityCapture as a photogrammetry solve to get a somewhat crude reconstruction of the location. It was enough so that we could get Ryan, Autumn and Hannah in front of a computer to look at the model. It gives you a much better idea than just static location photos."

"The one we settled on was Bogalusa Railroad Station in Louisiana," continues Ralla. "We took that model and sent it to visualization supervisor Pepe Valencia from Baraboom Studios, who made up some different blockings which we

< Stack brings Sammie to a train station to recruit Delta Slim for the juke joint. ILM created parts of the station environment and the train for the sequence. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

showed to Ryan. From here, Hannah's team also took the model and fleshed it out. Christian Kessler came in again to do concepts for the surrounding areas."

At that point, Ralla presented Coogler with the concepts, who immediately asked Ralla what Beachler thought of them. Ralla had not shown them to the production designer yet. "Well," recounts Ralla, "I then sent it to her, and it came back with everything annotated, crossed out, saying 'Why would you do this, et cetera?' However, by the third iteration, Hannah said to me, 'Thank you for letting me finish this job and actually designing a train station that looks like what I had in mind in its entirety.' It was a good lesson about getting production design, and really any other department, involved in any of our VFX work."

Prior to the shoot, Ralla had prepared a series of light studies for Arkapaw to aid in arranging suitable shoot windows based on where the sun would be at the shooting location at any point in time. These also came in handy to determine the impact and position of shadows from the greenscreens positioned on location. "I remember for the establishing shot," says Ralla, "we got that shot in the last possible minute because we were fighting the length of the shadow from the greenscreen. The greenscreen was exactly at the height of the train."

"Also," adds Ralla, "we had a lot of extras but any people waiting on the platform could not walk in that greenscreen shadow because it was static and the train that we were going to add would be coming in and then coming to a stop. So, anyone who would be in static shadow we would not be able to use. This was a bit of a compromise because Ryan wanted the crowd to cover as much of the platform as possible, but then Autumn wanted the light to be as low as it could possibly go. We ran frantically for three or four takes, and then that time window was over."

> A historic photo of the Yazoo and Mississippi Valley/Illinois Central Passenger Depot in Clarksdale, Mississippi, used as a reference for the film's train station. The photo is part of the Cooper Postcard Collection and is credited to the Mississippi Department of Archives and History.

Coogler and Arkapaw were keen to know if the shot was successful and requested Ralla do a test shot of the train arriving, especially with plans to only be on the location for a further day. Ralla sent footage from the lower quality video tap to Baraboom, asking them if they could track and composite the real-time train into the 'plate'. "They had to do it overnight and it was just enough time to put together a pretty decent test and show it to Ryan, who was happy, and we moved on," says Ralla.

Another aspect introduced to the shoot was a dolly representing not only the train but also smoke from the train. "On this film, everything we did needed to have a reference," revisits Ralla. "So that was going to be our smoke reference. That's what the smoke was going to look like. We were going to adjust everything that we were going to do in visual effects to what was happening on the set."

Special effects supervisor Donnie Dean orchestrated the smoke dolly. "What they wanted to do," says Dean, "was make the smoke move correctly through the crowd and then do it over and over again. You have shots of it wide and then you have shots of it close where people are walking through it. So, we made a small cart that ran on dolly track and it shot steam out just like the train engine does in the movie. There was an electric motor we put on it with a remote control, and we could just run it back and forth all day."

Ralla believes that tie-in helped tremendously with the authenticity of the entire train sequence. "It also set the timing and speed for the train to come in. It brought

everything together. People were looking at it as it was coming in because there really was something coming in, no one was imagining anything."

ILM, which had been involved early on in planning the sequence, modeled the train directly from the photogrammetry scan of the museum train and other reference. One element the studio introduced, notes ILM's Nick Marshall, was "the effect of that slight wobble that you get through those sheet metal surfaces. It's an oil canning effect. We really had to put a lot of time into just making sure that was absolutely accurate."

Ralla explains this further: "We actually went on a really interesting science project about materials and what makes painted metal look realistic. What often happens is that a lot of time is spent tweaking the shader and there's a lot of grunge added and weathering and all that, but it still doesn't look believable. With sheet metal, especially during that era when everything was more or less imperfect, you have these gentle warps in flat areas. The surface might be theoretically absolutely perfectly planar ends up having a bulge or it's slightly indented. It's also almost imperceptible, until it gets hit by light. Then all of a sudden you can see areas catching a highlight or a reflection. The train didn't look real until we added that—it was a late addition, but a real revelation."

ILM's main digital environment work for the train sequence became the buildings and areas beyond the greenscreen. "We took it over as a completely full CG environment," outlines Marshall. "We had such great reference from the art department and from Ralla. They'd all gone a long way into working out the details to be period accurate. What was also interesting was that it needed to be accurate in terms of racial segregation. There'd be one side of the rails where a lot of the black community live, and then on the other side of the rails is where the white people live. There's differences in architecture. There'd be more vehicles on the white side, they would dress differently. So we really had to take that into account because it's such a prominent plot point for the movie. We couldn't just ignore that and do generic extensions of everything."

Scenes directly on the platform had been filmed with the actors in front of a greenscreen. A series of sprites handled by visual effects producer James Alexander had also been acquired. "Since the train was green, green spill wasn't going to be as much of an issue as it would be on other productions," says Marshall. "One of the tricky things there was that some of the practical steam that had been so successful in the establishing shot started to really work against us because the wind was actually blowing in the opposite direction once we got into those later shots. We had to go through a process of cleaning out the practical smoke

< Previs frame for the station sequence by Baraboom Studios. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> Original plate and final shot from the train station sequence, where greenscreens stood in for the location of the train. Final VFX by ILM. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Visualization aided in working out where to place greenscreens for the station shoot and when to shoot based on the sun position at certain times of day. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>> Smoke dolly used on set to represent the train and the smoke coming from it, a gag by special effects supervisor Donnie Dean. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


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and doing quite a lot of paint work to rebuild the crowd so that we could then simulate smoke coming back in the other direction. It still served as a really nice reference for what practical smoke looks like in that environment."

Continuing with the idea of constant collaboration with all the disciplines on the film, Marshall had a chance to interact with Arkapaw as the shots were being worked on. "We'd be getting notes from Autumn where she'd say things like, 'What if I was shooting this practically? I would probably have put a light here just to create a little couple of pings at the back.' She was able to look at it as if it was a set, at that point, once we got it to a certain quality level. We did a few alterations just to adjust our lighting creatively to Autumn's taste. I think those last little quality improvements actually made a really big difference."

The choice to craft a CG train rather than attempting to film with a practical one was highlighted when Ralla attended an Academy screening of the film. "At the very end, after we had done a panel discussion talking about the work, someone came up and introduced himself as the line producer for *Killers of the Flower Moon*, which had actually shot with a real train," recounts Ralla. "He said, 'Oh man, I just wanted to tell you, if I had known that you can do a train to that level, I don't think I would've spent the millions of dollars that we spent to build a train and ship and truck it in from another state. I would have just built a train station and done a CG train.'"

"I said back to him, 'You know what? That is really, really cool to hear because your train was one of the main references for our train!' He was like, 'Are you kidding me?' I said, 'Yes, we looked at those shots, and we aimed to make it look just like that.' And then he said, 'I thought it looked just as good as the train that we built.' And that conversation just made me realized, we took our train far enough along, which was great to hear." **b&a**

> Practical photography for trackside. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> ILM's digital train, and reference images. The studio spent significant time giving the metal surfaces of the train a particular 'oil canning effect' look to ensure there was a slight wobble in the sheet metal surfaces. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Production designer Hanna Beachler reviewed a layout of the train station and directly provided VFX with some notes. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>> At top left, the referenced station, Bogalusa Railroad Station in Louisiana, and the plate photography for the Sinners scene. At right, ILM's CG elements and its final composited shot. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


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BOGALUSA


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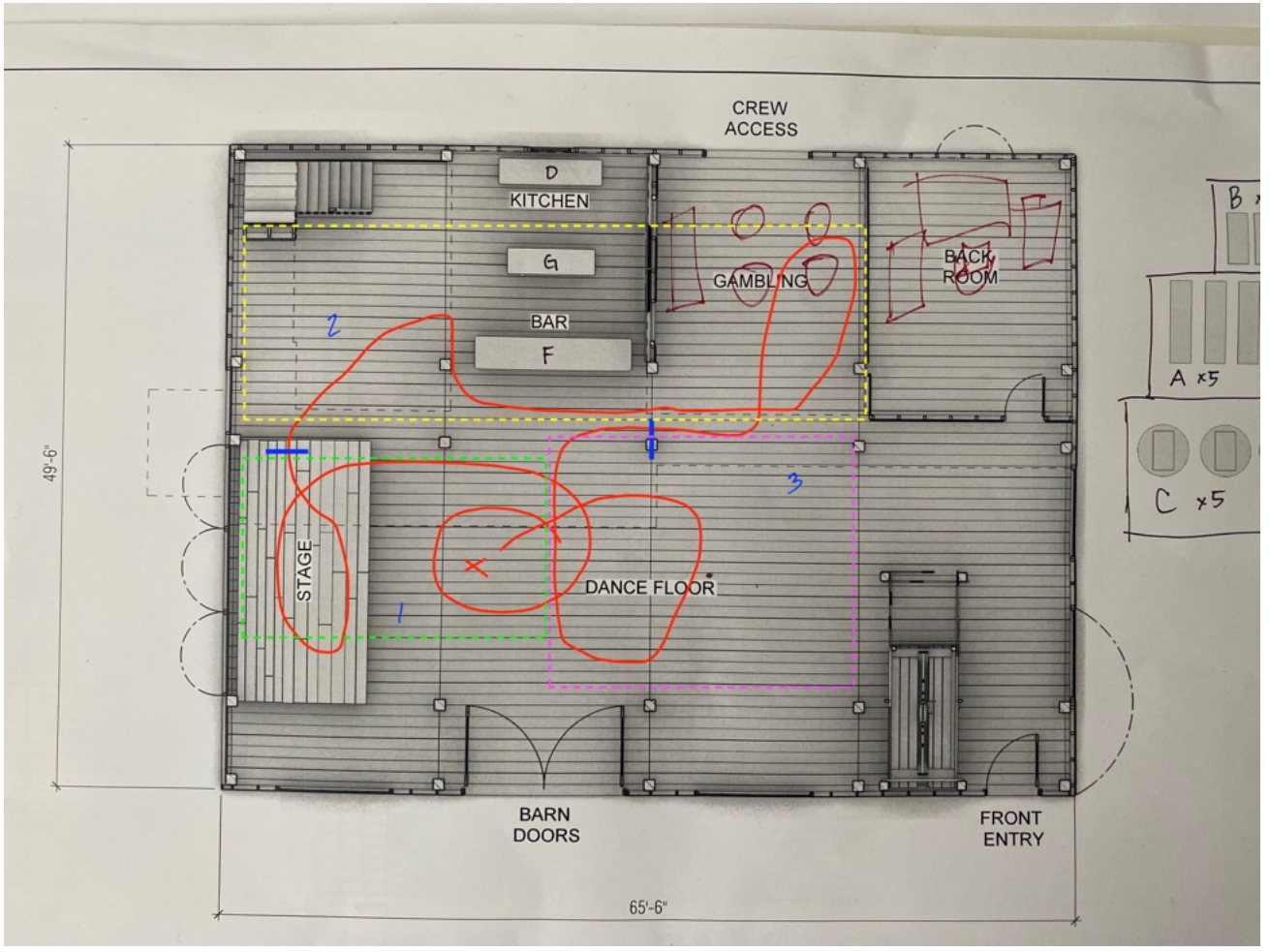
CLARKDALE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A DANCE FOR THE AGES

The making of the moving dance of the ancestors in the juke joint, including the challenges of crafting a oner.
By Ian Failes.

In a stunning oner in the juke joint, Sammie's playing somehow transcends time, summoning a range of musical ancestral spirits from various eras. The single take continues for three minutes and 17 seconds, and even includes a move up into the roof—now on fire—and an exterior pullback to now reveal the vampires for the first time. Three IMAX takes, and the CG take-over, made up the oner.

"It all really started with a painting by Ernie Barnes called 'The Sugar Shack'," states Ralla. "But we were all trying to work out how it would be shot. During a meeting, Hannah slapped the blueprint of the juke joint on the table and said, 'Autumn, why don't you just sketch in the camera path?' It was the camera move that was designed first."

"That scene was so beautifully written by Ryan," shares Arkapaw. "When I first read it, I was just excited by it. I'd not read anything like that before. I drew on an overhead of Hannah's set just the flow that I thought would work, knowing the angles and thinking about lighting. After we figured out what the world would be, and how we were moving the camera around, Ryan and I had to discuss what device to put it on. With an IMAX thousand foot load, you can't put that on a Steadicam. It's too heavy, so we had to down-spool the loads to half, which is 76 seconds. That meant, if you're moving a Steadicam around for only 76 seconds, obviously we're going to have stitch points."

Out of that initial planning, Beachler would continue to revise the dance floor and stage of the juke joint. "The whole set was built on the stage and we didn't lift it up off the stage like you normally would do," says Beachler. "It was built on the floor. And one of the pieces of that was that where the dance floor was, the two by fours that support the dance floor are quite a distance apart. So the boards moved up and down to give you that bounce. When you have all the stomping, you're getting dust and everything that accentuated with the lighting and that big moment of all the dancing happening around Sammie during the oner. We wanted to feel that pounding of the feet."

At this point, Ralla was involved in a weekend rehearsal for the oner on an empty taped-out stage with a Steadicam operator. The visual effects supervisor then had Baraboom's Pepe Valencia begin planning out a previs of the oner. "I sent him the script, I sent him the camera roll, and I said, 'Can you turn this into a three-minute shot.' We also sent him Ruth's costumes and he ran with it to a point where he even got lighting notes from Autumn. That previs was shared with executive music producer Serena Göransson and executive producer and composer Ludwig Göransson."

As the composer, Göransson had already been conversing with Coogler about the oner. "I remember having chills reading it and thinking about the possibilities of the music and how amazing it was going to be to create that moment,"

< Autumn Durald Arkapaw's camera paths drawn onto a top down view of the juke joint, for the dance of the ancestors oner. The scene was shot in IMAX and would require three takes and a CG take-over.

he says. “Early on, we had to come up with the right person to write that song that Sammie sings. One of the first people who came to mind was Raphael Saadiq. I had him come by and we wrote the bare bones of this song—’I Lied To You’—together. We talked to Ryan about all the different musical styles he was envisioning, and how it goes from Sammie to the other performers. After I knew what kind of styles of music Ryan wanted to set, we came to New Orleans and one of the first things I wanted to know was how long was this scene going to be? That's when Ryan said, ‘Well, let's have a meeting with our visual effects department.’”

Ralla then showed Göransson the three-minute previs. “I then scored that previs and showed it back to Ralla and to Ryan. There were some further changes and then finally we had a good timing for everything. Then we decided we needed a real rehearsal with extras on the stage so that we could map out how the camera was going to move and where the actors and extras were going to be. Plus, it was about where we would plan for the stitch points to be, with there being three planned in total. Our choreographer, Aakomon Jones, was crucial to this, too.”

In subsequent rehearsals, Göransson was able to almost ‘live-compose’ to suit any changes. “Ryan shot one of the rehearsals with his iPhone and I was there and could drag my music files to suit the timing. I was mapping it out real-time. It's almost like we were creating it on the spot during that rehearsal. After a dress rehearsal, Ralla stitched the three planned shots together and sent me a live-action previs, where the animation essentially got switched out with live-action. That was really helpful because then we had the exact timings and then they could finish planning out how they're going to shoot this with IMAX and exactly where the stitches needed to match to.”

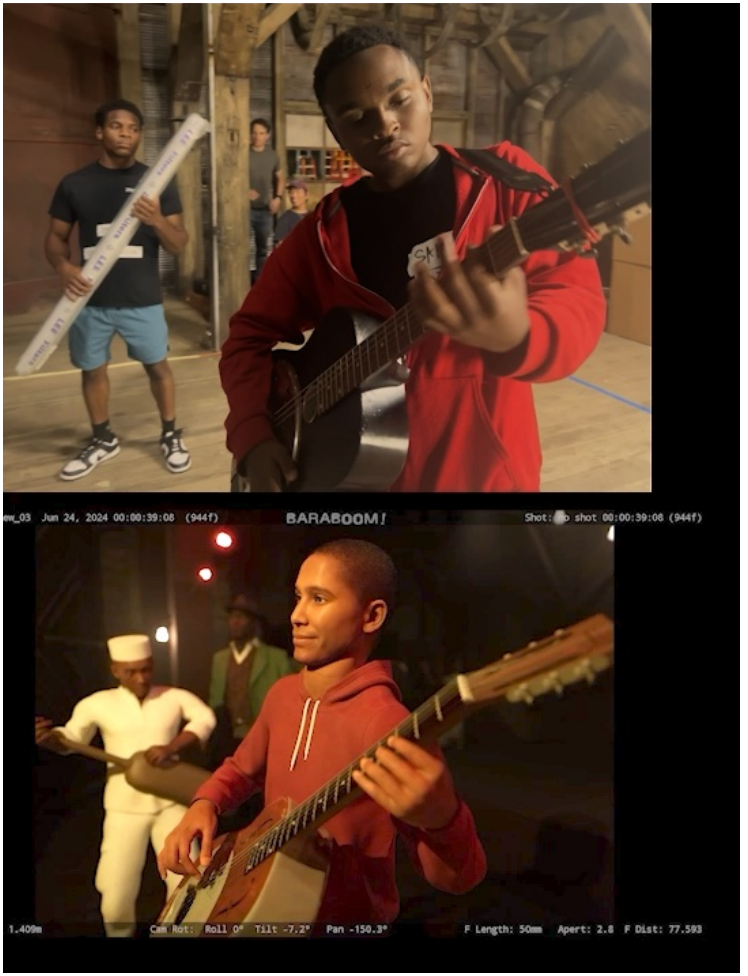
Göransson marvels at the final technical achievement involved in filming the actual scene. “I mean, that IMAX camera is something like 200 pounds. The way the operator managed that, wow, he was completely exhausted after each shot running around a hundred people. It was tricky because he had to be so precise. He needed to reach the DJ within 50 seconds. Like, exactly. I think the first stitch point is actually right at the piano after the DJ, and he had to time up with the music. And the rest was incredible, too.”

Göransson worked closely with production sound mixer Chris Welcker and music editor Felipe Pacheco on set to re-jig cue points on the fly. “We could take the session and essentially recompose the song so that the stitch point was now a certain point in the song, where necessary,” advises Welcker. “Then Ludwig could alter the rest of the song until we got to that next stitch point. We had to do things like that in order to make it so that when the camera would now start the second pass, we knew exactly where in the song it had to happen in order to start the new move. Some of it was like

> Michael Ralla (right) reviews an iPhone-filmed rehearsal of the dance with Ryan Coogler. Rehearsals and previs also enabled composer Ludwig Göransson to adjust his music and, at some points, even ‘live-compose’ which the scene was being worked out. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Baraboom Studios’ techviz setup for the oner featuring a top-down view, rehearsal frame, and CG previs frame. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>>>>>>>>>> These series of frames in the contact sheets showcase the Baraboom previs and the final shots from the entire surreal montage. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.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the twinning work where we used beeps and flicks to count people in at certain points. Again, it was really cool to see how all the different departments came together and make one of the most talked about moments in the movie."

Interestingly, Göransson retained flexibility in the music, that is, the music used to shoot with was actually different to what ended up in the film. "It's the same song and the same tempo, and the same instrumentation and same change of beats," explains Göransson. "When the hip hop dancers come on, it's all right there. But in the version we shot, the music was very blocked off. It was, like, here's the DJ section, here's the hip hop, et cetera. Once we had the images, it had to flow a different way to make it more cinematic. Instead of completely changing styles when we saw different music groups, we made it more like Sammie had a song and then every ancestor was passing by. Now you still feel like Sammie is forefront and center in the whole thing instead of other people taking the spotlight."

The surreal montage takes another turn when the camera then rises up to the roof, which is now shown to be on fire. To realize the roof burn, Ralla discussed with the filmmakers shooting a practical roof burning element. "I said, 'Let's shoot it for real, in the spirit of the film.' Everyone was like, 'You're crazy!'. But then the SFX supervisor Donnie Dean said, 'Yeah, we can do that.'"

"We worked on that for two months," says Dean. "We had to figure out what material would burn away at the right speed. We started out with a small panel, four feet by four feet, and we started trying to figure out how to make fire travel the way they wanted it to travel. The whole thing had to be done between 30 seconds to 50 seconds. Then we scaled it up to eight by eight, then 16 by 16. We made four of those panels at 32 by 32 feet."

"We shot on a stage, making sure that the embers were cool enough that they didn't damage the camera when they fell," adds Dean. "There were a couple of IMAX cameras down below filming it all. To protect the cameras, we used air knives, which have compressed air blown through a very thin opening that pushes air across the top of the cameras and all the fire away from it."

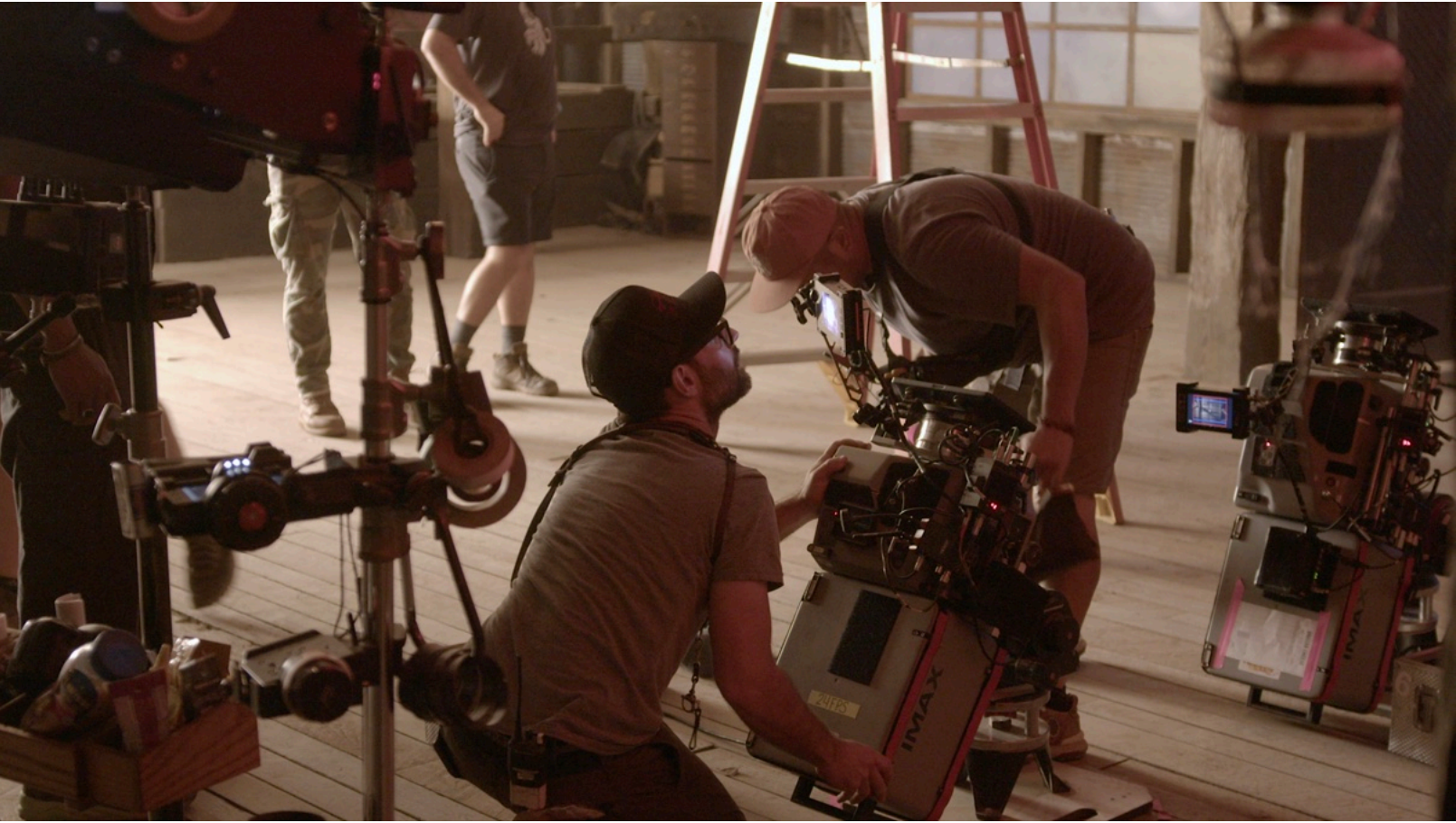
The element shoot proved successful. However, at one point, Coogler determined that the oner would continue as a push-through of the burning roof, over the embers and all the way to the ancestors. "That meant we could no longer use the element we shot because we needed to show parallax," notes Ralla. "Espen at Storm was still able to use our IMAX element as high-end reference to recreate the whole thing, push through and follow the embers. That then reveals a sky and stars element that was a piece of long exposure photography shot in Joshua Tree, California."

The camera then follows an ember back down to the ground to reveal a burnt out juke joint and the ancestors playing and singing in and around it, while also revealing the vampires. When it came to editing the oner, editor Michael Shawver had already been part of the conversation with the rehearsals, and would monitor the actual takes to ensure the stitches would eventually work. Knowing that the scene would be a oner, Shawver says he would review the takes by

< Roof burn test element orchestrated by special effects supervisor Donnie Dean. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

> Setting up the IMAX cameras for the roof burn. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> A wider view for the roof burn plate with the IMAX cameras shroud in protective blankets. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.


IMAX

“getting into the zone and seeing where my eyes would wander. There might be times we worked with VFX to do certain speed ramps or adjustments if we needed to.”

Storm Studios deployed a single compositor for the oner who worked on the scene—totalling more than 4,500 frames—for almost four months. As noted, the stitch points were heavily planned out, with Storm needing to decide for each transition how much of each side of the transition to keep. “We would try and keep as much as possible from the A side in the foreground and as much as possible from B side as the background,” discusses Nordahl. “One of my pet peeves with oners is when they do digital zooms to cut into the frame, because the two plates might be framed slightly differently, so you might need more over-scan, so you start digital zooming in to try and match the frames, and then you go back out. A little piece of me dies when I see that, because I feel like that's our hands in VFX showing. I'd rather paint my way out of it and create more over-scan so it can stay at the full scope. We tried to really treat it as if the whole thing had been filmed all together.” **b&a**

> The IMAX-filmed roof burn element. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>>> Storm Studios, which stitched together the plates for the oner, also crafted an entirely CG push through the roof as it burnt, since the camera had to move up through the roof to show the stars and eventually revealing the ancestors playing in fiery ruins of the juke joint. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

A RAFT OF INVISIBLE VISUAL EFFECTS

The vampires come inside, and a look at bullets, birds and bling. ***By Ian Failes.***

Amongst *Sinners'* 1013 visual effects shots are several that might be considered invisible effects shots. Some are mentioned already in other chapters, while others moments of the vampires entering the juke joint, a series of environment extensions (such as for cotton field shots), bullet hits, digital birds, and even a ring replacement moment for the film's mid-credits scene.

All hell breaks loose when the vampires are finally invited inside the juke joint, and a series of fights break out. Stunt choreography, stunt burns, staking and lots of blood were key parts of the fight scenes, alongside the aforementioned twinning work when Smoke and Stack needed to be in the same shot, and when they themselves fight each other.

Outpost VFX carried out a large range of visual effects for the battle, including set extensions for shots looking outside the juke joint, practical effects enhancement, vampire eye effects, burns from fire and holy water, and many vampire kills. The juke joint was filmed as both an exterior location and an interior set, with bluescreen covering doorways.

"There were a few shots where we transitioned over the threshold of the barn," outlines Outpost visual effects supervisor Ian Fellows. "For those, we'd put in the environment. Michael Ralla and his team had put together a bunch of array stitches for us. We were able to set up a skydome from the 360 or 180 photography that matched and was orientated correctly to the barn. That gave us the shots for the outdoors."

When the battle begins, Outpost first looked to dealing with gunshots. "Ryan Coogler was very specific about the muzzle flashes that these guns would fire," observes Fellows. "They'd actually acquired specific guns for that period that they could fire off so that they could get the characteristics of the muzzle flash. They gave us a library of material there that we used. There were also very specific lens flares that Autumn was particular about. Again, they acquired a lot of plates for us of lens flares in different sections of the image that we could use to graft in as much reality as possible."

Blood hits were next on the agenda. One challenge for Outpost was matching to and incorporating blood hits that were consistent in color and viscosity. "With practical blood," says Fellows, "you can't really control it. A lot of our work was unifying what was shot practically as well as adding our own blood to that. When we first saw the sequence, it became pretty clear to us that we would need to take a pass very quickly at just grafting in crude element placements to help work out the pacing and continuity requirements."

"We used LiDAR of the interior of the juke joint to work out a system of gradual increase of spatters on the floor so that when we cut from one angle to another, you're still seeing the same blood spatters," continues Fellows. "That was done

< & >> The film features a number of invisible environment extensions and augmentations for shots in the cotton fields.

as a two-and-a-half-D approach. In some cases, the characters were then walking through the blood that we'd established in earlier shots, so then we'd switch it out for something with a bit of a smear."

For staking shots, Outpost was encouraged to make the blood spurts more over-the-top in terms of goriness. "We'd sometimes add more gore to practical hits and even add 'jets' of blood," says Fellows. "Michael Ralla's instruction to us was something like, just go to town, have some fun, dial it up to 10 and we'll see if it becomes too much. We were actually never told we'd gone too far—it was always, 'Give it a bit more.'"

Two characters engage each other and are quickly engulfed in flames from the burning juke joint doorway, with one staking the vampire while they're both in flames. A reference pass of stunt performers being stunt burned was filmed. The final shot featured Outpost digital-doubles. "It was shot clean with no fire at all, with stunt performers wrestling on a crash mat," states Fellows. "It became quite a challenge to not only burn their clothes but actually set fire to them fully and have that integrate with them and the environment around them. We ended up with a largely CG FX-driven approach for the flames, but then we had a lot of fire elements as well that we added in."

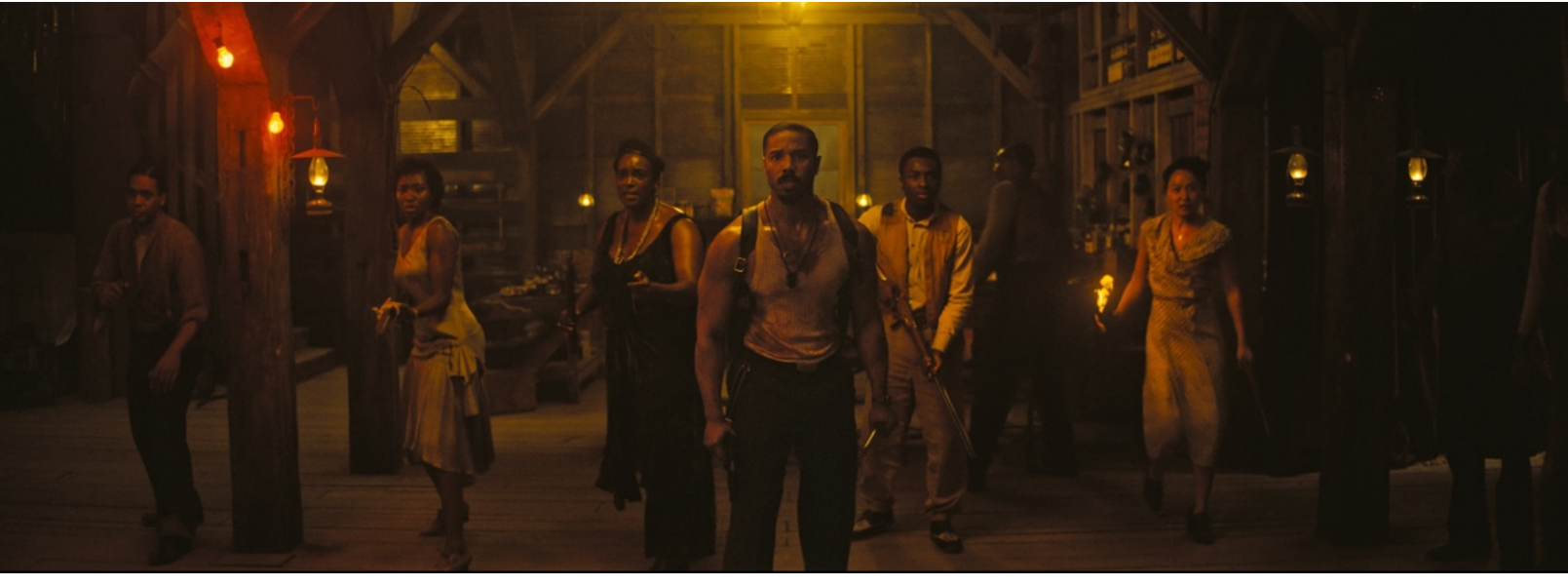
Holy water as a weapon to burn the vampires was a further effect that Outpost worked on, details Fellows. "That one ended up predominantly as a 3D FX solution. It started with a 2D concept draw-over. They wanted it to be like an acid burn. They had shot some quite interesting practical reference of skin bubbling. We grafted that in where we could—one shot is a very fast one of Remmick getting the water thrown over him. You only get a few frames to read maximum impact. It ended up being a 3D growth on the face and then a 3D simulation of burning. We'd look at lots of mad scientists burning things in acid and found there was a very specific sort of character to the steam that comes off of it, quite wispy.

> In the juke joint, the characters ready themselves for the entry of the vampires. Set extensions, practical effects enhancement, vampire eye effects and burns were key invisible effects crafted here. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

As mentioned earlier in relation to the make-up effects, actors were able to wear special reflective contact lenses for when they became vampires. Where the lenses could not be worn, or where additional non-hero characters needed those reflective vampire eyes, Outpost added them digitally as a 2D effect. "We had head tracks done and we had the eyes," outlines Fellows. "Different parts of the eye could rotate so that we could change the highlight or glint."

Outpost then had a series character repositionings and paint-outs for the juke joint, describes Fellows. "There was a female character who, because of the way the scene was edited, would be on the stage battling somebody and then in the next set of shots she was on the floor, and then back on the stage again. "We had a bit of work to take her out and put her back in on the stage consistently. There was also an extra who somehow found his way into the back of a lot of shots. We would remove this character or use elements that Ralla had shot to drop people in over him. He'd even made his way into the sprite shoots as well, so even when we were looking for a different person, there he was, again!"

The next kind of effects work for Outpost was dust busting, largely a remnant of days gone by in visual effects where most photography is digital. With *Sinners* shot on film, Outpost was one of the vendors that went about removing dirt and dust from scanned film frames for their VFX shots. "It was quite interesting to me having to train everybody



again in how to work with old school film," remarks Fellows. "There were some procedural approaches, but mostly I was just saying, 'Grab a paintbrush and go and paint the dust out.' It's far quicker than it would be to engineer some complicated solution to the problem."

Finally, Outpost was responsible for a fun 'format change' where the film transitions between aspect ratios from 2.76:1 to 1.43:1 at the top of the battle. "Here we had to rebuild the frame behind as the transition occurred," explains Fellows. "The transition happens over two shots; the reverse shot where we look at Remmick coming in has a bit more of that continuation from what was a wider frame. That was the easy part because we were just cropping it and then growing over time. But the first shot involved two-and-a-half-D projections, painting and blending, where we had to rebuild the mill and recreate characters' legs where they were cropped out."

Later, in the aftermath of the vampire stand-off, Smoke confronts Hogwood and his men using a hidden arsenal of firearms, before ultimately succumbing to his own gunshot wounds. Stunts, special effects and visual effects combined to realize the scene.

"There's one particular shot with the Thompson submachine gun that took a lot of planning," notes special effects supervisor Donnie Dean. "We start out on Smoke firing the gun, and then panning over to the car with bullets going into it and sparks everywhere. Then we go to the other side and you see that the bullets are coming out of the car and through the people. So, making all of that look right took quite a bit of rehearsal. I think we did that shot in testing probably four or five times. There were a lot of practical squib hits, and VFX ones as well."

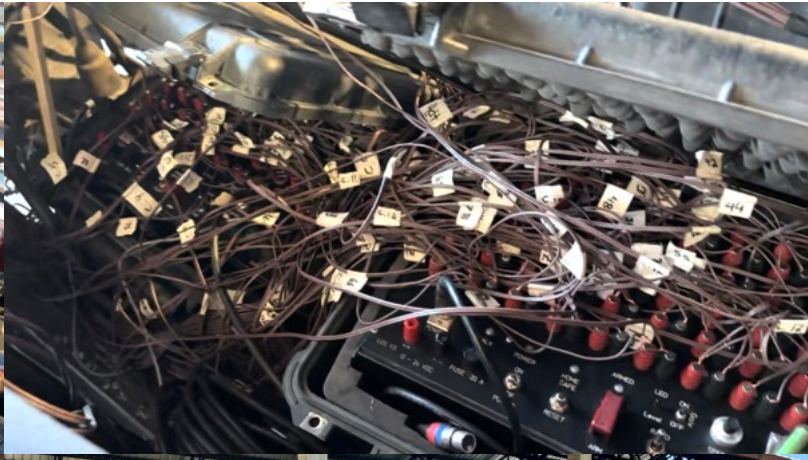
From stunt coordinator Andy Gill's perspective, the bullet hits were a significant part of the work. "We had a car built with 300 practical hits in it—inside and outside tires, windshields, the radiator. I also pitched that wraparound shot so that we could do half the wrap or half the hits with a wraparound and do it once again. That scene really has everything, including blood hits. The minimum number of blood hits on the 12 guys was five on each, some had more. There were entrance wounds and exit wounds, which made it look really great."

At various moments during *Sinners*, birds such as circling vultures are seen in the frame, foreshadowing the evil that is to come. Engaged to deliver the birds was Light VFX. The studio researched black vultures, analyzing their flight speed, weight and physical features before modeling and grooming the creatures. "We started with a test of CG birds next to real birds on a very close-up foreground plate," advises Light visual effects supervisor Antoine Moulineau. "The director was sold on that. Then we did a number of different shots of birds flying or being in the scenes."

Invisible effects also came into play in an unexpected way for the mid-credits sequence set in 1992 in which an ageless Stack and Mary appear at a local blues club and talk to an elderly Sammie. "In that scene as filmed," outlines Ralla, "Stack has a massive 1990s gold ring that said 'Smoke', because he was wearing that ring to honor his brother. However, in the test screenings, the audience was confused, thinking, wait, is that Smoke who is now dressing like Stack? So, we had to change the ring in VFX to say 'Stack' instead."

< Light VFX's vulture lookdev and reference imagery. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

>> Special effects supervisor Donnie Dean rigged up the cars with hundreds of practical bullet hits. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

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“The thing is,” continues Ralla, “a Stack ring had never been made. That font didn't exist because Ruth Carter had made it up for the Smoke ring. We started designing a ring by finding a similar font. We showed it to Ryan and he said, ‘I don’t know, can you ask Ruth?’ The same thing had happened with Hannah Beachler and the train station! I really should have known. Anyway, I did text Ruth and asked if she could design a Stack ring.”

“I got a text from Michael and saw the prototype they had made,” recalls Carter. “I said, ‘Oh, no, that’s not the font.’ It was something like 11 o’clock at night, but I got to my computer and I did a quick draft of it, showed him the sketch, and then they redid the ring, and did a nice job. It was great to be consulted on it like that. The whole film was just one big collaboration. It made me keep feeling like I was a big part of a film family.” **b&a**

> Costume designer Ruth Carter’s sketch for the replacement ‘Stack’ ring sent to visual effects supervisor Michael Ralla.

>>> The original ring (original plate) and the re-design handled by VFX from Carter’s sketch.


STACK


SMOKE


$TACK

CREATING A COHESIVE LOOK: A CONVERSATION WITH FOTOKEM

Behind FotoKem's process. ***By Ian Failes.***

As discussed, the visual effects team on *Sinners* had to work within a hybrid photochemical/digital workflow. Many of VFX's dealings were with FotoKem, which was responsible for 65mm lab services, dailies and the film's digital intermediate. To discuss the journey that *Sinners* made from film, to digital, and then back to film, *befores & afters* sat down with key members of FotoKem's team: Andrew Oran (65mm project supervisor), Joseph Slomka (principal color scientist), Kostas Theodosiou (digital intermediate supervising colorist), and Angelique Perez-Brennan (digital intermediate lead finishing producer).

b&a: I'm always interested in the earliest conversations you all might've had with the filmmakers about Sinners?

Andrew Oran (65mm project supervisor): My first interaction was when Autumn called up and said, 'Hey, can I show Ryan some 70mm? He is curious to see what it looks like.' So I kind of cleared my schedule and found a bunch of good stuff that I thought would excite him about 70mm. These were all 5-perf 70mm. That's the Panavision format, a format that we can project here at FotoKem. Included in that was a trailer for *Phantom Thread*, a trailer for *TENET*, a reel of *2001: A Space Odyssey*, and then a camera test roll from *The Hateful Eight*. And that was noteworthy because that was the only one of these items that was the 2.76:1 aspect ratio, the Ultra Panavision aspect ratio, that they ended up shooting in.

I showed Autumn and Ryan these items and, my God, they just loved it. It was like watching them fall in love with 70mm before my eyes. All I did there was kind of nudge Ryan in a direction I think he was already thinking of going. I think seeing 70mm sealed the deal there. Afterwards, just in conversations with Autumn, they said they really wanted to test Ultra Panavision. The next step was camera tests that they shot in that format that we also processed and printed.

Joseph Slomka (principal color scientist): The *Sinners* visual effects team came to us several times and really wanted to understand what the pipeline and the workflow was, and how film works from a technical standpoint, how scanning works, and how they interact with it from the scans. They tried to get a very deep technical underpinning. We spent a good couple meetings in person here going over it and they would go back and they would think about it and then we'd come back and we'd have a follow-up long before any of the production even began shooting.

< Before and after frames from a 65mm 5-perf (2.76:1) sequence in the film. © 2025 Warner Bros. Entertainment Inc. All Rights Reserved.

Angelique Perez-Brennan (digital intermediate lead finishing producer): I've worked with Autumn on a lot of features. She definitely wanted to make sure that Michael Ralla had all the information he needed to start the project and make sure everything came across properly. We had multiple meetings with Michael, just explaining film in general, like the texture of it, the density of it, how it works and how our dailies pipeline works. That was one of the things that Michael wasn't used to. Normally when you do a dailies pipeline, if it's film and it's 35mm, you do a scan once and everything comes across as far as LUTs and CDLs. For this particular show, because it's large format, we do a telecine of the 65mm.

With the telecine, you do these HD scans that are in a specific gamma. They're not in a log format, which is something that Michael Ralla's used to receiving. He's used to being able to use the LUT and CDL all the way across. So what we had to do when we were explaining from the get-go was tell him that you're not going to be able to use the same CDL as you're using on your dailies. You're going to have to use our LUT plus you're going to have to do a color match in your VFX department. We had to help Michael figure out how to get that done and get as close as a match back on his VFX round trips to editorial as possible.

b&a: This project seemed to have the added complexity of being shot on location and deliveries having to happen over long distances. What was that like?

Angelique Perez-Brennan (digital intermediate lead finishing producer): They ship over the film to us via a secure procedure. We process it through our lab, we then get the processed film up to the telecine bay. They scan it in an HD format. Then that goes to dailies colorist John Rocke. He develops the dailies LUT along with Joseph with what he wants the look to be. John has worked with Autumn on almost every one of her features for dailies. She has something called Frames, which is an app we developed on the iPad. Once dailies are going, she can look it all up on her iPad and make comments—'This scene looks too dark', et cetera. John and Autumn go back and forth and discuss the look.

Then, too, every single day Kostas would go in and try to check the dailies and make sure that they were going in the direction that they wanted. From there, we would then process the dailies as the normal dailies workflow, upload QuickTimes and ALEs and that type of thing to editorial.

Kostas Theodosiou (digital intermediate supervising colorist): Because the dailies are film and it's a large format, we have a telecine that does the large format. There's maybe only one or two telecines existing in the US that can do this kind of format. We do dailies as high-def to get the Keykode numbers from the side of the film so the editors know how to cut it. Remember, it's not digital, you're dealing with film. Then we have to scan for the DI the sequence that editorial gives us back with eight frame handles. We only scan selects before we go to the DI, but the initial telecine is your full dailies—every single take from beginning to end of the roll.

When John was done with the dailies, it all goes to a particular frame store that has all the frames. The director and the cinematographer can do light changes and send it back to dailies. It's not like the old days where you might take a Polaroid, or even a digital still, send it to the colorist, and the colorist looks at the still. This one is instant because you have it on your frame store, you see what you've sent and you see the corrected media. If there's a big difference, then you can regrade it. So when it comes back to me, as a

starting point for getting to the look that they wanted from the dailies, I can see that it might be the updated look, not the original.

Joseph Slomka (principal color scientist): There's a reason we have to have two separate steps, ie. the telecine and the final scan, and it's about the time it takes. Essentially, there's so much data that's acquired for the large format film that the telecine process happens nearly one-to-one. They can hang the film, they can basically play it 24 frames a second and they can get that material out. The scanning process can take significantly longer, depending upon how absolutely precise and how much bit depth and how many pixels they're pushing through that process. So the idea is that the telecine process is necessary for them to get the material back for dailies. You process it, you can have the film hung up on the machine and we can get Autumn the material within the day. As opposed to, if we scanned them all, everything would take so much longer that if there was a problem in production, they wouldn't see it until they had long broken the set.

Then, once they pick the selects of the high resolution scans of the material, even then, while those are being done, that material goes off to dust bust and cleaning if there's any of that required. So there's at least three different copies of each element moving around through different processes in post.

Kostas Theodosiou (digital intermediate supervising colorist): By the time it gets to the DI, all these processes have been done. The dust busting is the number one thing. Once we have the selects, we have to go through and make sure there's no dust on the film whatsoever or any imperfection.

This is the way we do it on every film format; with large format, it takes two times, one is a telecine and one is scans of the selects. If you have 35mm and you want to go and scan all your dailies, our scanners for 35mm are much faster. You can do your selections on 4K scans almost in real-time.

b&a: Joseph, I understand FotoKem also built a new 15-perf 8K film recorder for this project. What were some of the challenges in just getting that running and being as high fidelity as possible?

Joseph Slomka (principal color scientist): This is really attributed to the development group and Freddy Goeske who is the head there. We previously created a 5-perf output version of this that we started using on *TENET*. The way that previously film had been recorded was with CRT-based film recorders that were decades and decades old at this point. The idea was, well, film is hanging on, let's do something better.

We had a 5-perf version of this machine, but there were a lot of challenges in understanding and how to operate a 15-perf; the way the film gate and the transport works and how the film moves through the mechanism and being able to make every frame be in the right place that it needs to be for as long as it needs to be—no more, no less—to make sure the images are exposing.

My part of that was the color science. So, things like, when the camera is pointed at our imaging device to make sure that there's a proper amount of light, how long we expose each frame, how long is the shutter open, how long is the shutter closed, light control in the room, how to calibrate

>> Before and after frames for this IMAX scene of Choctaw vampire hunters searching for Remmick.

that so that the output from the imaging device corresponds to the amount of density that we need on the negative.

Moving film is not easy. If it's off by even a fraction of a perf in an exposure that's visible, even at one 24th of a second, it'll be clearly seen. For the entire reel, everything has to be perfect. A 10th of a millimeter in recording will be a foot tall when it's projected. The tolerances need to be very, very tight. You need to figure out how to move the film as quickly as possible to get the recording done on time. You need to figure out how to move it as precisely as possible to make sure that these anomalies don't happen. There was just a great deal of learning process.

We also had to make the hardware. So we have a machine shop and we had people design custom electronics and we had custom lenses designed. We had to build the thing that it sits on. We had to have a chassis built and that was a custom built by our woodshop. We had all these high tech fully machined pieces being bolted down to a wooden table. We had to weigh it down. We had custom software development to be able to drive it.

So, while we were making the movie, there was this entire project going on to make that happen for recording 15-perf film. *Sinners* was the premier demo of that. We worked really hard to make sure that the color was accurately portrayed, that it was really what Kostas was seeing. In the middle of this, we were running film passes to make sure that what was coming out of that recorder was matching what was going on with the DI, so that the color decisions that Kostas was making digitally would be represented on film—which is the opposite of how we work for the Christopher Nolan projects where everything that's filmed needs to be represented digitally.

Kostas Theodosiou (digital intermediate supervising colorist): With our DI theater, we had to split the screen in half and butterfly the digital with the film so it matched identically. Then we had to make sure that any little touch up we did was baked into the LUT when it went to the recorder so that it matched perfectly.

Joseph Slomka (principal color scientist): Yes, that was an important part of the design of the process because it has to get done on time. The idea was to make it so that what was being done digitally would be represented accurately on the film. That took a lot of prep work, but once Kostas was done, we just recorded it and that was it. We didn't have to go in and individually time each individual scene using photochemical tools. It had to just go out and it had to just work and then cut together and then look like the filmmakers intended.

The side-by-side that Kostas mentioned was really important to our process to gain filmmaker confidence. You look at something in one room, you look at something in a different room, and they can feel different. The idea of having that splitscreen where half the frame is digital and half the frame is film was that we could sync them up and they can see all of the minute differences that are important to their eye and we can fix the ones that they feel need to be fixed.

b&a: When it came to color grading, Kostas, tell me about the kinds of things that Autumn, you and Ryan wanted to do with the film?

Kostas Theodosiou (digital intermediate supervising colorist): At the beginning, we set a few days to balance and get a feel for what direction we were going to go, how we were going to handle the interiors and the exteriors, and what is the look of the film?

We went through a lot of looks with Autumn. We did the

primary color correction the way she wanted. When Ryan came in, they had a great collaboration, they worked great together in the room. They would debate some shots—a little bit brighter, darker, or what have you. Or if it was a visual effects shot, I would do a 75% of the color balance and I would say, hold on until we have the final because that might need altering.

Angelique Perez-Brennan (digital intermediate lead finishing producer): Watching Autumn and Kostas work, they had a really good working relationship. Autumn likes to see a really natural looking picture. She doesn't like the super bright contrast. She likes to actually see skin tone how you would see it with your eyes, and she likes it a specific way for that. And working with Kostas during the color correction session, they really came up with the proper way that she wanted to see the image. I think she also learned from Kostas how film would look in different formats.

Kostas Theodosiou (digital intermediate supervising colorist): I've done a lot of film grading with movies shot on film. I worked as if it was with printer lights, how a film timer would approach the film in the laboratory, so that I could be as close as truthful to a laboratory color timing. I start with that and that helps you a lot when you go all the way to the end for a film out because then you're not putting in illegal colors that would never be reproduced back out to film.

I color grade with this idea of printer lights and then if they want to touch up something with a window or twist a hue, I could also do that. Then because the movie was a film capture with a proper lookup table, it didn't handcuff me at all to have to use all these extreme tools or key this or key that, or do all this extra work, because it fell right in by using the proper color offsets—red, green, blue, yellow, cyan, magenta.

Basically, I was calling printer lights, like, 'OK, you guys want it a little bit darker, okay, I'll go a point darker or point brighter.' It was not, 'Let's bring down the lift or the gain or the gamma.' I maintained the true color correction of the film throughout the whole pipeline, all the way to go out to film. And that's why the film and the digital matched so closely, because it was like doing a printer lights timing but in a digital format.

b&a: This is a film that feels so 'perfectly dark'. I feel like Autumn is so confident in shooting dark. What challenges does that bring in color grading?

Kostas Theodosiou (digital intermediate supervising colorist): Well, she has a style that she told me about from the beginning which was, 'My style is to keep natural, and I like to have depth in the picture and I want to see environment, especially inside the buildings.' So therefore, she told me, 'Don't crush the blacks. Don't try to create a contrast because I don't like the unnatural contrast.' It was low light, but we were able to retrieve all the information and to keep it looking natural. There's that sequence in the shop. I saw stills, initially, of the sequence and it seemed so bright. The light was coming from the window with a yellow curtain and the door was open and you have natural light coming from the outside. But Autumn used the proper exposure and the proper filtering in order for me to have a good starting point. And you can see the wood grain, you can see the jacket that has a light gray blue

>> FotoKem crafted a final color grade using a printer lights timing approach, but in a digital format.

tone to it. We didn't miss any color. However she accomplished photographing that, for me with the proper LUT and the proper use following printer lights, it came out beautiful. I didn't push it. I didn't break the gamma of the film curve.

b&a: The specific delivery of 70mm film—what are the particular challenges of getting these out?

Angelique Perez-Brennan (digital intermediate lead finishing producer): IMAX has to create platters for their film. Everything was finishing at the same time as we were going to record. There were literally reels that weren't done where we were already starting to record other parts of the reel because we just had to get it done in order to make the deadline.

Once we get it through the recording phase, we then had to go through the whole lab processing side of it. We had to send that to IMAX where they were QC'ing each individual reel, and then from there creating a platter that then goes out to the different theaters. It is definitely a tough process and it's something that we specialize in and we work hand-in-hand with IMAX to get that going and get that done.

Kostas Theodosiou (digital intermediate supervising colorist): You have to think early on about how you're going to break the reels when you go to IMAX. On the DI, each reel would be between 19 and 22 minutes. It depends how it cuts based on the music or what not. But in order to make the IMAX reels, they are only three-and-a-half minutes long, each one of them. So you have to have the proper breakup in order to put them together.

b&a: There really seemed like so many stages and things to think about.

Kostas Theodosiou (digital intermediate supervising colorist): Yes, but it was fun to do it and we all wanted to be a part of this film and they understood. It was like one big family working together to get something nice on the screen. It wasn't like, okay, you're the producer, you're the director. Starting with Ryan, I can't say enough good things about him. He will come in, he will hug everybody. He knows every name, every face, everybody. He will light up the room. His wife and producer Zinzi Coogler, as well. And Tina Anderson, the post-production supervisor, she is amazing. We had a lot of fun and we worked with great people, from Ryan all the way to his crew, the visual effects department, the editorial department. We missed them all afterwards.

Angelique Perez-Brennan (digital intermediate lead finishing producer): We were spending, at some points, 10 to 12 hours a day together. It was like a family in that room. **b&a**

> A scene from Sinners, as projected in IMAX. This photo was taken from an IMAX projection booth. Photo by Taylor Umphenour.