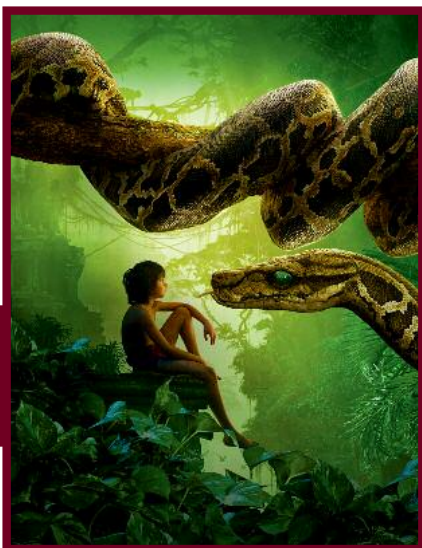# *American* Cinematographer

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THE JUNGLE BOOK

BILL POPE, ASC EXPLORES CINEMATOGRAPHY'S FRONTIER

PLUS:
YVES BÉLANGER, CSC
DEMOLITION

On Our Cover: The orphan boy Mowgli (Neel Sethi) faces the snake Kaa (voiced by Scarlett Johansson) in *The Jungle Book*, shot by Bill Pope, ASC, who combined live-action and virtual cinematography on the production. (Image courtesy of Disney Enterprises, Inc.)

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Welcome to the Jungle

Bill Pope, ASC pushes the boundaries of virtual cinematography for director Jon Favreau's photo-real *The Jungle Book*.

By Michael Goldman

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Director Jon Favreau is an ardent admirer of the 1967 animated Disney film *The Jungle Book*, but his new feature of the same name is more than just a re-imagining of that story. Favreau opted for an essentially unproven virtual-production methodology, and the result is an almost entirely digitally rendered and animated film that is intended to look completely photo-real. To realize this ambition, the director tapped cinematographer Bill Pope, ASC.

The film features a sole live-action actor, 13-year-old Neel Sethi, who portrays the human boy Mowgli. Only those pieces of the sets that Sethi directly interacted with are real; beyond them, all environments, and the entire cast of supporting animal characters, are CG constructs. Among the filmmakers' key collaborators was Rob Legato, ASC, who served as the film's visual-effects supervisor and second-unit director-cinematographer.

Favreau says the idea was to use a process "not unlike an animated film, in that it started with a story department, storyboards and an animatic version. But we moved on to a process more like *Avatar* [*AC* Jan. '10], whereby we created a motion-capture version of the movie and then shot the actor [in native 3D] while viewing him interacting with [animated elements] in real time. Then we took all these pieces, like a puzzle, and assembled them using the latest technology. In that sense, we were standing on the shoulders of a giant in *Avatar* — that was the film whose process ours most resembled, but unlike that film, ours takes place [on Earth], and everything in it had to look entirely real. We wanted to put a live-action sensibility into something that could only be done in a computer."

All of which raises the question: Is "cinematography" the proper term to describe how *The Jungle Book*'s images were captured?

Pope contends that the methodology allowed him to make traditional cinematography decisions for each shot, but "in the digital space." He recalls, "Initially, I said I wasn't sure how to do it. I told them it involved working within a purely digital space, which is not really my forte. I suggested maybe they should get someone who has done this sort of thing before. They said, 'No one has really done this sort of thing before,' and Jon said he preferred someone who considered himself a live-action photographer but who had also been down the visual-effects road and could understand the things they were talking about. So I met with several of the key players on *Jungle Book*: Adam Valdez, visual-effects supervisor at MPC; Andy Jones, animation supervisor; Rob Legato, visual-effects supervisor; Joyce Cox, visual-effects producer, whom I knew from [*Men in Black 3*]; and Chris Glass, production designer. And talking with them, I began to see the process and how promising it could be. These are the people — along with Mark Livolsi, the editor — who advised Jon on a daily basis as we moved

Opposite and this page, top: Mowgli (Neel Sethi), a human boy raised in the jungle by a pack of wolves, teams up with a panther, a bear and other beasts in an attempt to find his way back to human civilization and save himself from a vicious tiger in Disney's *The Jungle Book*. Middle: Director Jon Favreau (left) and cinematographer Bill Pope, ASC discuss a scene. Bottom: Visual-effects supervisor and second-unit director-cinematographer Rob Legato, ASC reviews footage.

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Top: Mowgli receives guidance from Bagheera (voiced by Ben Kingsley). Middle: Shere Khan (voiced by Idris Elba) searches for Mowgli. Bottom: Favreau reviews a scene with Sethi.

through the film. A visual-effects-based film like this one absolutely relies on communication among the department heads. No one can move forward unless we all move forward. So for the following months, that group of people met with Jon on a daily basis to make this movie. After I signed on, we then moved immediately into virtual production at Digital Domain."

Girish Balakrishnan, Digital Domain's lead virtual-production technical director, notes, "Digital Domain was the primary virtual-production vendor on the film, in charge of everything from supporting the virtual art department with production designer Christopher Glass, to running [Digital Domain's Lab department], to previsualization, motion capture, virtual camera, SimulCam and post-visualization."

Also key to making everything look "entirely real" would be the work of visual-effects vendors MPC, which handled all environments and most of the animals, and Weta Digital — where Dan Lemmon served as visual-effects supervisor — which created primates for an important sequence. Both companies built upon earlier work done for the recent *Planet of the Apes* movies and *Life of Pi*, in order to create realistic animals

of varying species that had to perform as lead and supporting characters for an entire movie.

As virtual-camera layout artist John Brennan explains it, the Digital Domain team "built the sandbox where the creatives played. There's a lot to learn and reconcile in a hybrid space like the DD stage, but there were and are certain mandates — one being that virtual cinematography should be recognizable as cinematography. There are aspects of virtual production that are new and disruptive, but I don't think that's the whole picture. We worked under Rob's supervision to adapt cinematic roles and expectations, and I think [that's] another side to the story."

Thanks to new innovations in ray-tracing technology within Pixar's RenderMan software, the visual-effects artists were able to create stunningly believable CG characters and backgrounds. Given that the film will be exhibited in a limited number of theaters using the new 3D-enabled Dolby Vision laser-projection system (see sidebar, page 40), audiences will be able to scrutinize the team's work down to the smallest detail.

Although he was stepping onto technology's cutting edge and embracing a largely untested production method, Favreau stresses that his collaboration with Pope was strikingly familiar. "My cinematographer was a partner with me in the same way he would be in a live-action film," the director says. "You scout [virtual locations] together, rehearse together, and then, finally, you capture the images. Lots of times on effects films, you sit over someone's shoulder while they work in a box, designing previs. Or in animation, you do layout with an artist. Here, I incorporated all the department heads that I'm used to collaborating with on live-action movies, and I enjoyed an ongoing partnership with them."

Among the technologies required to enable such a collaboration within the virtual space was an updated SimulCam process similar to the one used on *Avatar* and run by the same SimulCam supervisor, Glenn Derry. The SimulCam process

Top: Mowgli meets with Gray (voiced by Emjay Anthony). Middle: Pope captures Mowgli running in a muddy action sequence. Bottom: Pope lines up the 3D camera rig.

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Top: Mowgli journeys through the jungle with Bagheera. Middle and bottom: The crew captures bluescreen action sequences with Sethi.

utilizes multiple, movable OptiTrack motion-capture towers — comprising OptiTrack cameras hung onto trusses with wheels that can be maneuvered for each setup — to track a live-action camera's position. The system then uses that data to drive a virtual camera in the CG world. On the back end, the SimulCam system receives a live camera feed, tracks the camera position in 3D space, and, in real time, keys out bluescreen and composites live actors with CG characters and environments.

For *The Jungle Book*, this system was directly linked to a larger, newer virtual-cinematography system built around a rendering engine called Photon, used here for the first time on a feature film. It was also, Balakrishnan notes, "the first time a game engine was deeply integrated into the production pipeline and used to previsualize the entire film from start to end." Photon, as Balakrishnan explains, was developed as a collaboration between Microsoft and Digital Domain as a technology and pipeline, built on the foundation of a custom version of the Unity video-game rendering engine, specifically geared for virtual production.

This innovation allowed Pope and Favreau to make detailed cinematographic choices — including camera movement, lens choice, depth of field, framing and lighting — in every step from rough layout through final post. Legato refers to this methodology as "doubling down on the knowledge and experience we [gained] on *Avatar*," adding, "this is why *Jungle Book* looks and smells like a real film, shot on film.

"This movie is a game-changer in that sense," Legato continues. "The informed live framing, staging and newly added lighting choices, coupled with dramatically choosing the proper lens and camera moves, are now all squarely in the province of the experienced live-action cinematographer and director. The tools were used primarily to create the look and feel of a real live-action movie instead of the heightened look of an animated one. The goal was to make the audience forget what was done

on a computer and what was not — to remove the separation between visual effects and cinematography."

For Pope, the process began when he walked onto Digital Domain's 60'x30' motion-capture stage in Los Angeles with what he calls a "glorified iPad on a tripod" in order to "actually go on a virtual scout with Jon Favreau within that [virtual] space." That "glorified iPad" was in fact a custom carbon-fiber rig that incorporated a high-resolution OLED monitor connected to two joysticks and an arrangement of motion-capture markers, which allowed the device to be tracked throughout the stage, thereby capturing all of Pope's virtual-camera movements.

In turn, as Balakrishnan says, "the virtual camera produced an image rendered in real time on the computer — through the virtual lens of the camera and displayed on the monitor" via the Photon engine. The system's interface, including the joysticks, enabled Pope to dolly, boom and change lenses on the fly; he could also physically move the virtual-camera rig — "OLED monitor, joysticks, mo-cap markers, and carbon-fiber body as a whole," says Brennan — as if he were holding a real film camera. Favreau could also employ an Oculus Rift virtual-reality headset and Xbox controller on the stage, placing him within the volume — the space in which the digital imagery is "shot" — alongside the virtual characters and allowing him to maneuver 360 degrees as he made decisions about blocking and the placement of environmental elements. Tracking markers on the VR headset also enabled Favreau to walk through the virtual environment as he moved about the stage. Balakrishnan notes that Favreau's preference of the Xbox controller as his virtual interface was influenced by his experience as a video-game enthusiast.

Pope explains, "We would move through that space, and the art department and animators and I would all watch it, discussing if we could move this way, or work over here on this part of [the virtual set]. So, basically, we carved

Top: Mowgli floats down a river with Baloo (voiced by Bill Murray). Bottom: Pope and crew work within the virtual space.

out a space to set the scene, and then, after the volumes were built, we would go back to the mo-cap stage and block out the scene, picking which angles we liked and so on."

Such capabilities meant the filmmakers could build a detailed animatic, which Legato describes as "a template for every shot in the film." Through this animatic, Pope could lay out shot specifics, including the choice of camera platform — Technocrane, dolly, handheld, Steadicam, etc. — whether the shot would ultimately be captured with live action or created entirely as CGI.

Brennan further describes the workflow chronology: "The director dictated size and scale changes way back in preproduction in the main mo-cap volume at Digital Domain. He wore VR goggles or scouted with the virtual camera while an artist would scale characters up and down in real time on a computer. A change might still happen over the artist's shoulder or via notes, but many decisions were made in this context where 'feel' developed. When we shot our previs pass on the movie — still at Digital Domain mo-cap — we did so with stuntmen in mo-cap suits playing many of the movie's animals; oftentimes two stuntmen were combined into a single quadruped animal. While these stuntmen performed, along with [Neel] in a mo-cap suit, Bill and Rob would shoot rough camera ideas during the live takes, in the moment with the v-cam. Finally, after shooting the entire movie in this manner, we then moved to the virtual-cinematography volume at Los Angeles Center Studios, where all of

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Top: Mowgli encounters Kaa (voiced by Scarlett Johansson). Bottom: Legato lines up the virtual camera.

this data had been refined and assembled into scenes, and Bill — with input and interplay with and from the director, the editor and Rob — shot the entire film in earnest, virtually with the v-cam, to stay one step ahead of the actual photography with Neel."

Based on his virtual-camera experiences, Pope worked alongside artists — tasked with adding rough character animation to the art department's virtual sets — in Digital Domain's Lab department, laying out precisely where he wanted things placed and directing the lighting for each shot.

"The 'Lab,'" Balakrishnan notes, "is a term that originated from the *Avatar* days. It [consists] of a group of technical artists who take the sets developed by the virtual art department — VAD — and combine motion-capture data as well as hand-keyed animation to develop a master scene. This master scene then gets delivered to the virtual-cinematography stage, where the cinematographer can lay out 'cameras' in this virtual environment."

This "collaborative and iterative process," Balakrishnan continues, gave Pope "the flexibility to experiment with

shots before committing to them on the actual live-action set." Indeed, Pope could lay out virtual dolly tracks, drive a virtual crane, and operate a virtual camera in the capture volume, and then have all of those choices replicated in the virtual-camera layout.

"Bill would work with me for quick animation changes, set adjustments and dolly-track creation, and he would work with Girish to pull focus, create effects and dial in the look of each scene," Brennan adds. "His virtual-camera lens package matched the one he would use to photograph the real actor later. He was free to pick up the [virtual] camera for handheld or attach it to anything he physically lugged into our volume, or that virtually existed in the current master scene. At the [Los Angeles Center Studios set] for the live-action shoot, he had a tracked SimulCam viewfinder available to him, with content from these master scenes. He could then shoot the actor and the virtual animals and environment in context, and compose everything accordingly."

The virtual-camera environment was particularly useful in allowing Pope to test lighting as he would on a live-action set; the cinematographer had at his disposal a custom digital light kit that included controls for things like key light, fill and bounce light, flags, gobo patterns, and soft boxes. As it had been on *Avatar*, the virtual-camera workflow was powered by Autodesk's MotionBuilder software, but on *Jungle Book* it was further linked to the Photon rendering engine. According to Balakrishnan, the addition of Photon enabled advanced rendering capabilities for lighting; depth of field; lens flares; motion blur; color grading; and various dynamic effects, including fire, rain, fog, water and smoke. All of this meant that Pope and his team could see even the subtlest virtual elements rendered instantly.

"Before *Jungle Book*, out-of-the-box MotionBuilder alone lacked the advanced rendering fidelity required to make these aesthetic decisions for shots," Balakrishnan explains — while making it clear that MotionBuilder is the industry-

·|· *Jungle Book* Shines in Dolby Vision ·|·

This past January, director Jon Favreau presented selected clips from *The Jungle Book* at Disney's El Capitan Theatre in Hollywood. As invited journalists filed out of the event, many commented on the way the clips had been exhibited: in 3D, using the Dolby Vision laser-projection system. It was clearly a brighter 3D experience with better dynamic range than what the attendees were used to seeing.

And that crowd was lucky to see it. At the time of Favreau's presentation, the El Capitan Theatre was the only American venue where the 3D-enabled Dolby Vision laser projector was up and running on a permanent basis. Hollywood's Dolby Theatre was configured to incorporate the 3D system on an as-needed basis for premieres of major films — and, as of this writing, Dolby officials have said that four more 3D installations are operating in Europe and that a deal is in place to bring 100 to China over the next five years. Most importantly, though, 15 AMC Prime cinemas in the U.S. are preparing to debut the system in concert with *The Jungle Book*'s arrival.

Although *Star Wars: The Force Awakens* and a few other films had previously screened in this new format, *The Jungle Book* will be seen in more cinemas in 3D-enabled Dolby Vision than any movie to date.

Other companies are pursuing laser, as well. Imax has rolled out its own large-format system, known as Imax Laser 3D, which has been installed in selected venues around the world. Furthermore, projector manufacturers — including Christie, with whom Dolby partners to build Dolby Vision laser projectors — are in the process of pursuing other flavors across the indus-try. All told, the initiative to roll out Dolby's system to multiple cinemas with *The Jungle Book*'s release gives significant teeth to the argument that the time has arrived for high-end laser projection to definitively prove itself as a superior consumer 3D-viewing format.

"The new generation of projection technology is going to be laser, simply because you can push more light out of it than you can with xenon-based systems," says Stuart Bowling, director of content and creative relations for Dolby. "But in our case, we also redesigned an optical path of the projector to overcome challenges with regard to being able to produce a very inky black compared to what [most 3D systems] offer today. We partnered with Christie to build the Dolby Vision projector, combining the laser-projection light source, redesigning optical heads and some of the processes inside the projector to get us to a native contrast inside the projector of a million to one [while] producing 20 stops of dynamic range.

"And for 3D," Bowling continues, "our projectors are powered by a 6P laser, which means three primary colors per projector that are tuned specifically for our dichroic filters [in the lenses on] Dolby 3D glasses [that the audience wears]. That means there is no filtering whatsoever inside the projector — no light lost — and that helps us achieve 14 foot-lamberts, bringing 3D up to 2D light levels, meaning more light [and] more color saturation. Combine that with the improved contrast ratio and you have significant improvement over earlier generations."

Now that regulatory issues involved with installing laser projectors in public venues are no longer inhibiting rollout, the primary reason deployment is currently limited is the significant expense involved in properly retrofitting a theater for a laser system. Nevertheless, Bowling states, "Laser is now deploying; it will take several years. You always run into that with advancements in technology: There is a high cost to jump in and be an early adopter. But it's really [those early adopters] who help get the ball rolling, and that in turn helps lower the cost for implementation. Until then, you will find laser projection typically in bigger auditoriums — what we call 'premium large format' auditoriums."

Such venues, Favreau suggests, would be great places to see *The Jungle Book* and learn firsthand how laser projection might change the 3D exhibition experience.

"We're helping to introduce this technology to North America," the director says. "This movie was meant to be a rich experience, and new innovations and new technology have always driven audiences to theaters if you combined them with great stories. To see this movie exhibited in 3D with extended dynamic range gives the story a very lifelike quality, which is what we wanted. We wanted audiences to think they were seeing something real. In that regard, this can help push our medium forward."

— Michael Goldman

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Mowgli meets with King Louie (voiced by Christopher Walken).

standard software used at the majority of motion-capture facilities, allowing for simple rendering/shading, and primarily enabling the virtual camera to accomplish general blocking and staging of the virtual environment and captured animation.

"With the dynamic streaming architecture of Photon," he continues, "creatives are now able to see multiple rendered views in the virtual world, with MotionBuilder acting as the hub controlling and recording the entire scene. Bill Pope, using his custom virtual-camera system, was able to not only direct the framing of characters in shots — either live in a motion-capture volume with actors, or virtually with animated characters — but could also direct how dappled light through trees fell on a character, live-controlling the depth of field, seeing how motion blur might affect an action sequence, and tonally dictating the overall mood of a shot.

"With each shot captured in the virtual-camera volume," Balakrishnan continues, "Bill sat down with one of our Photon artists and hand-lit the shot in the computer with the custom digital light kit we developed for him. With

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Left: Mowgli keeps a safe distance. Right: Pope mans the controls for the camera crane.

these tools, he was able to approach the live-action shoot understanding how a 10-foot bear might sit next to a 4-foot kid."

Important interfaces that enabled Pope and others to interact with the virtual world included iPad lighting controls, MIDI controllers, and pan-tilt wheels originally used by Legato in real time for previs on *The Aviator* (*AC* Jan. '05). According to Balakrishnan, the pan-tilt wheel was important because it provided "an analog feeling of operating a camera head on a computer-controlled dolly track.

"Each tool was carefully tuned to give Bill an accurate hand-operated feel in an otherwise digital world," Balakrishnan continues. "The workflow grew to be so natural that Bill would occasionally even bring in his Steadicam operator, Roberto De Angelis, to operate certain shots in the virtual-camera volume. Then, as shots were captured, we had an editor on set ingesting the live feed and live-cutting the material straight into an Avid, giving the camera operator and director real-time feedback on how a shot would influence the edit."

"The idea," Pope adds, "was to

make sure we did not make moves that could not be done by human beings working in a real jungle. So we limited ourselves to small crane moves, dolly moves, handheld and some Steadicam."

The live-action shoot — during which the filmmakers shot Sethi performing as Mowgli — took place on two adjacent 100'x50' stages at Los Angeles Center Studios. Pope's team shot the action in native 3D in the 1.85:1 aspect ratio using dual Arri Alexa XT M cameras, which were set to open-gate mode and mounted in Cameron Pace 3D stereoscopic rigs. A flexible SimulCam volume was also incorporated into each live-action stage, allowing Pope to see — via a headset, iPad or computer screen — Sethi's performance in concert with the digital characters as the actor interacted with puppeteers on the physical set.

The Alexa XT M cameras recorded to onboard 512GB Codex drives, and were outfitted primarily with Panavision Primo zoom lenses. Pope also carried Primo primes, but he notes, "On the 3D side, you don't want to change primes too much. In the virtual environment, to mimic the quality of those lenses on the animatic, we mimicked the millimeters of the Primo

lenses — lining a scene up and choosing the same marks we would choose on that lens [for live-action shooting]."

Fiber-optic cable linked the 3D camera rigs to dual 3D engineering racks — one for each camera. Pope and 3D camera engineer/digital-imaging technician Robin Charters created looks for each scene by building LUTs using Framewright's LinkColor software, connected to Blackmagic Design's HDLink Pro for on-set color correction. The filmmakers could also view 3D imagery on set using 42" Sony LMD-4251TD 3D broadcast monitors.

Complementing the filmmakers' insistence that their camera movements be based in reality was their desire to incorporate subtle aberrations that a location shoot in the jungles of India would have introduced. "We wanted imperfect skies, lens flares, sky flares," Pope explains. "We wanted all the things you would really run into if you were shooting in the jungle and trying to maneuver there — all the things those hardships would cause. So we built that into the photography. We wanted to put into [the viewers'] minds that we really went there and did this."

Lighting-wise, this required careful tracking of lighting data back and

Standing beside the 3D-camera rig, Favreau examines a setup for a live-action scene.

forth between the virtual realm and the live-action stages, as photographic decisions continued to evolve during the course of production. The filmmakers took great care to follow their virtual-lighting blueprints — including their animatics, which incorporated virtual-lighting data and metadata — and gaffer Bobby Finley and lighting-console programmer Joshua Thatcher also carefully logged all real-world lighting setups, instruments and other details for the visual-effects team so that they could ensure the real and virtual lighting always matched.

"What's interesting here," Balakrishnan opines, "is that virtual-lighting data was actually dictated by Pope in the virtual-camera layout in Photon, and then was brought onto the live-action set, all down to the exact position and angles of the sun. MPC and Weta would then receive this lighting information to ensure that the base lighting of their virtual sets matched the live-action captured plates."

Meanwhile, for live-action filming, the art department devised a system of breaking large sets into what Pope calls "palettes," or sections on rollers — many of which were modular and could be reused and reconfigured to represent multiple locations, while others were set-specific. Representing

the portions of the jungle that Sethi needed to interact with, these palettes could be quickly rolled onto either of the two stages, assembled, disassembled and rolled back off, keeping the production moving at peak efficiency.

Supporting this strategy, both stages featured identical bluescreens and lighting rigs so that the filmmakers could move between the stages and "change lighting quickly so that we could be anywhere — day or night, dusk or dawn, and [looking] in any direction," Pope explains.

To light the stages' bluescreens, Finley says he used LEDs — specifically Cineo TruColor HS instruments — more than he ever had on a feature. Finley adds, "Mac Tech 960 [LED Sleds] were my overall ambient top light. I had Quarter Grid bags made for the 960s to give them a space-light feel, [and they were] bulbed at 3,200 degrees. At either end of the stage, we built three 8-by-12-foot soft boxes, which were used to extend the skylight. Each rig was on chain motors, so we could raise and lower them as needed. Each soft box had two 960 LED Sleds in them. To wrap around fill light when needed, [key grip Tony Mazzucchi's team] hung eight 20-foot-wide by 40-foot-high Ultrabounces on traveler track, in front of the bluescreen, into

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Art director John Lord Booth III consults with Pope.

which we bounced more conventional lighting instruments — Arri T12s and [Bardwell & McAlister] 12-light Mac Tech HPLs."

From a dimmer room outside the stage, Thatcher used his High End Systems Hog 4 console to control the light, which also included 24K tungsten Fresnels configured both as floor units and mounted in bluescreen-covered scissor lifts; according to Finley, the Fresnels were most often projected through tree-branch gobos for a dappled effect. The stages were also networked through two Hog 4PC systems, which controlled two High End Systems DP8000 DMX processors.

The production frequently used interactive light on set in order to complete effects that were begun in the virtual jungle. For example, Finley explains, "There is a point where Mowgli jumps into a ravine, where he is suddenly in the middle of a water-buffalo stampede. You can see his lighting is influenced by the shadows of the animals as they run by. For that scene, we used a 10-foot high and 18-foot wide LED wall [supplied by VER] to light him. The art and visual-effects departments created a video clip populated with water-buffalo shapes, and when played on the LED wall through a media server, it created variations of shadow textures falling across his body.

"There were also several scenes where he walks through the forest with Bagheera [the panther, voiced by Ben Kingsley] and Baloo [the bear, voiced by Bill Murray], and there is no set," he continues. "In those situations, we lit Mowgli with projectors. Again, the art and visual-effects departments created a video clip, this time of dappled light to match the [virtual background]. When projected on Mowgli as he walked on a

turntable, it gave the effect that he was walking through the jungle. We created both daylight and moonlight scenarios. It was very important that the dappled effect match closely with the [virtual] world to sell the illusion."

The digital-intermediate process — which was performed at Technicolor Hollywood with ASC associate Steven J. Scott, Technicolor's vice president of theatrical imaging and supervising finishing artist — was also key to seamlessly weaving together each of the production's many facets. For this work, Scott and his colleagues Mike Sowa and Charles Bunnag used Autodesk's Lustre 2016 Extension 2 color-grading system.

Favreau says the colors where Baloo resides, for instance, were "inspired by the color palette of the [animated] film, in terms of the tone and humor." Therefore, he adds, this portion of the jungle represents "a more golden world, where it is always blooming and the sky is always blue." Other

parts of the movie — particularly when Mowgli is in danger — are visually much darker.

Given the movie's unique, hybrid nature, Pope notes, "we were polishing to a much finer level than on an ordinary DI. It was more elaborate, involved and collaborative."

"It was an unusually collaborative process," Scott agrees. "Jon and Bill would [sometimes] end up wanting to go in a bit of a different direction than what was originally delivered. They might want to add a feeling of heat or warmth as Mowgli is running through the jungle, for example. So, in some cases, we took brilliant CGI material and finessed it, with Bill Pope setting looks and Rob Legato also involved in a unique way, guiding the material that was coming to us from MPC and Weta."

Legato suggests that in many ways, *The Jungle Book*'s biggest innovation was the creation of a methodology

for filmmakers "who are fluent in analog storytelling to be able to tell their stories with the same fidelity [using] digital tools. My basic thesis is that all filmmaking and all creativity is analog. You need to feel a pencil on a paper — or pluck a string to create a musical composition. So here, we let traditional filmmakers look through a camera — look up, down and sideways — and make the thousands of little decisions in real time about what inspires them about a shot or scene."   ●

◄ **TECHNICAL SPECS** ►

1.85:1

3D Digital Capture

Arri Alexa XT M

Panavision Primo