Overview

Chas Jarrett on

Sweeney Todd

Article by Estelle Shay

*A*s a filmmaker, Tim Burton has earned a reputation for crafting films that are quirky, visually arresting, frequently dark or gothic, and above all, original. His latest — *Sweeney Todd* — based on the 1979 Stephen Sondheim musical about the 'Demon Barber of Fleet Street,' is all of those things, and more. Having eyed the property for years, Burton convinced his frequent partner in crime, Johnny Depp, to take on the plum role of Benjamin Barker (aka Sweeney Todd), a man sent to prison under false charges by a lecherous judge who covets his wife and child. After serving 15 years of hard labor, Todd returns to London with not much else but vengeance on his mind, and partners up with the equally unhinged shopkeeper Nellie Lovett (Helena Bonham Carter). The two then proceed to slice and dice the local inhabitants, serving them up as meat pies to unsuspecting patrons.

To help realize his vision for the macabre tale, the director called upon visual effects supervisor Chas Jarrett and The Moving Picture Company, a frequent collaborator on Burton's projects. Chief among the visual effects challenges was the re-creation of a gritty and squalid Victorian-era London. Burton's initial inclination had been to shoot the live-action using minimal sets and extensive greenscreen — an idea that Jarrett obligingly explored in preproduction. "We began to test with greenscreen techniques," Jarrett recalled, "and the shots were completely convincing. We produced tests both for daytime and nighttime environments that looked very realistic, and obviously were very controllable. But I think Tim soon found that having his actors in an all green set — especially when they had the added effort of singing — was just a bit too impersonal. The greenscreen stage is a very empty environment, and it can be quite distracting. So once Tim began to rehearse, the movie became smaller in scope in that he started to focus more on interior and quite intimate environments as a way of giving his actors more around them that they could connect with and play off of."

During preproduction, Jarrett worked closely with Academy-Award-winning production designer Dante Ferretti to pin down a look for the London exteriors. "It was interesting, because the word 'stylized' was used quite frequently in preproduction. But it soon became clear that we didn't necessarily have a perfect definition of what 'stylized' meant. A really huge cue for that came when Dante was recruited to the show. The stylization that he was keying on was still realistic-looking, but it had a kind of theatrical stagi-

ness to it. The sets had to look real and comfortable, as if things were made of real materials. But a window would be placed in a very particular spot, and the light would stream through it in a very particular way, and cast a very particular shadow. So the framing and composition of images were very considered."

As Ferretti and his crew began construction at Pinewood Studios on a dozen or so full-size sets, Jarrett and MPC digital effects supervisor Gary Brozenich — who was instrumental in a lot of the visual effects design work — mapped out their own approach to the virtual environments that would expand the real sets on a grand scale. Shots included everything from simple set extensions involving one or two views, to highly complex 360-degree views, to all-CG photoreal environments. "Ninety-five percent of the time, even our matte paintings were based on photographs of real London buildings that were projected back onto 3D objects, placed into position, given rough lighting, and then worked on top of that. So it was mostly a 3D-based approach."

Period photos and paintings provided the visual effects team with its initial frame of reference. "Tim had found a lot of photographs that he felt portrayed the right sense of theatricality — interesting black-and-white images from the turn of the century — and he shared those with us. We took that as a jumping-off point to go out and just photograph London in huge depth, because we wanted to use a photogrammetry technique for as many buildings as we could, rather than creating them from scratch. We had very specific requirements for the type of images we needed, and our visual effects photographer, James Kelly, spent months and months trolling through London annoying people who owned houses and buildings, asking if he could photograph them. London still has many of those old buildings from the pre-Victorian era, so much of it was very usable. It was a big data-wrangling effort, but that was our main research. We put it all in a big bible, and then we would sit with Dante and choose buildings that we felt were appropriate for the period and for the look. And although those buildings, in reality, weren't next to each other, we would cut them out and stick them next to each other, kind of redesigning streets based on them, and doing rough layouts in CG."

To turn those rough layouts into photoreal CG environments that matched the live-action sets, MPC's research and development team devised a custom lighting tool, 'Isis,' that expanded on the photogrammetry approach. "The basic concept is that you take a calibrated camera and you photograph your build-

ing from a number of different perspectives — we'd shoot anywhere from two to twelve positions — and with a number of bracketed exposures. Then Isis takes all of those images and looks for similarities between them; and where it finds points that correlate, it will effectively create a 3D point for those details. When you have a lot of images and a lot of these corresponding points, the result is that you get a very basic 3D model based on your photographs. The system then allows you to go in and refine the model by adding lots of detail to make it a perfect production model. But what you always know is that you have photographs that line up perfectly to it. So ultimately, you can take the original photos, combine the multiple exposures from each position into one high dynamic range image, and the system will project that image back onto the CG model you've created, in effect texturing it.

"The aim was to get as much of the textural quality of the buildings from the photographs as we possibly could, because these buildings had enormous history and character to them. A lot of that is in the look of the materials they're made from — stone that's been weathered for 200 or 300 years, woodwork that's been eaten by woodworms — details that make it feel more real. Rather than have an artist sit there and try to paint in that history, if you can capture it from these really high-resolution images, then you're a long way there. Isis allowed us to do that."

Extensive previz, led by previz supervisor Martin Chamney, also proved invaluable in designing the look of shots and determining the scale and scope of the environmental work. "The previz really helped us to understand the size of the London we were going to have to create, and allowed us to choose the best methods. For me, it was also a very technical resource. We did a lot of technical previz where we would take a sequence that was going to be a CG environment, and create reams and reams of printouts for the art department on set, so we could mark the floors and figure out what world was going to be around you when you were standing on a greenscreen stage."

Sweeney Todd opens with a dark and moody view of the mist-enshrouded Thames, as a sailing ship with Sweeney Todd onboard looms out of the fog to dock in the harbor. The opening shot, which came up late in the show and hence was not part of the original previz, was nearly all computer fabricated by MPC. "That was actually one of the simpler shots in the movie, but also one of the nicest-looking. The boat itself is fully CG, and the ocean is fully CG, but the wake in front of the boat, where the

As Todd makes his way to Fleet Street, the camera — in a fast-paced POV — zips down claustrophobic alleyways, ending at Mrs. Lovett's dingy pie shop, where the vengeful barber finds a kindred spirit in the shop's proprietress, who recycles his murder victims into meat pies for her unwitting customers. More than a dozen interior and exterior sets, including the pie shop and its barber shop loft, were designed and built on stages at Pinewood by production designer Dante Ferretti and his team.

The Moving Picture Company augmented the practical sets — particularly the exteriors — adding upper stories and lengthening streets as need. Digital artists relied on a photogrammetry-based approach to the creation of period London exteriors, using high dynamic range images derived from extensive multi-angle photography of real London architecture to texture-map their 3D models with authentic detail. Dramatic skies composited into the shots added a desired atmospheric touch.

water is teeming to the left and right, is real. For that we sent a cameraman down to the Thames and shot boats coming towards camera, then just rotoscoped out the splashy elements and comped those in." Atmospheric effects were culled from reels of smoke and fog elements obtained in a big element shoot. "We used CO_2, incense smoke and various different types of smoke machines and smoke pellets — just to create a variety of different looks because we knew we were going to use that — and we layered those elements as the boat comes through. Things like sails flapping on the boat were actually a 2D warping effect the compositor did to make the static sails appear to flutter in the wind." The camera cuts to a view looking toward London's historic Tower Bridge, then travels down the riverbank, taking in the dockside activity. Views of the riverbank included digital water and 3D bridge, with greenscreened people composited into the shot, along with mist and fog elements.

As Sweeney disembarks, the camera zips down narrow, claustrophobic streets at an impossibly rapid clip in a quirky POV shot dubbed 'London Assault.' The all-CG shot served to establish the look and feel of the film, and provided a convenient way to get from dockside to Fleet Street with minimal explanation. Bookended by seamless transitions in and out of the live-action that were shot without benefit of motion control, the London Assault was one of MPC's most challenging sequences. "It was about 12 months of solid work for that one shot. Not only was it challenging because it's all CG, it also had 27 live-action elements of people that had to be shot motion control and comped in."

The speed of the camera move complicated the task. "We used a Super Cyclops rig, which can move faster than any other motion control rig I know of. But even with it moving at full speed, Andy Bull — who programmed the rig — still determined that we had to film at two frames per second. That meant that all our actors had to be moving at 1/12 normal speed so that when the film was played back at 24 frames per second, it looked like they were moving at the proper speed. Imagine walking up some steps where normally you'd take one step per second, and instead you have to take one step every 12 seconds. That takes enormous control. In fact, most people just cannot do it, because walking actually involves a bit of gravity, and gravity can't be slowed down."

Jarrett recruited a number of mime artists for the greenscreen shoot. "About half of the people in the shot were movement specialists, and our choreographer Francesca Jaynes — who was also our choreog-

rapher on *Charlie and the Chocolate Factory* — spent a couple of weeks working with them, teaching them how to move in slow-motion. We would film them moving at normal speed, then slow it down on video and show it to them so that when it came to actually doing the shot, they were all very well-rehearsed. Even so, it was extremely hard to shoot. We spent four days doing that one shot, just endless takes over and over again. But I have to say the actors were remarkable. When you watch the shot, you'd never know they're moving in slow motion."

The POV ends at Fleet Street and Mrs. Lovett's pie shop. For exterior views of Fleet Street, Ferretti and the production art department designed and built a full-size set at Pinewood Studios, taking the buildings up to two or three stories — as high as the stage could reasonably accommodate. MPC then extended the set both vertically, up to five or six stories tall, and horizontally for several views looking down the long, narrow street. "In this case, we had no real buildings to go out and photograph for our extensions; so very often we would go onto the real set and do our photogrammetry, so that we had all the correct textures."

Having learned of his family's sad fate from Mrs. Lovett, Todd is reunited with his prized collection of shaving razors in his former flat above the pie shop, and vows to exact a murderous revenge on Judge Turpin (Alan Rickman), the man responsible for his misfortune. In a dramatic pullback, the camera moves through the second-story window, telescoping further and further back to reveal the cityscape from on high. "That was a real one-off shot; and because it was such a specific view looking down onto the buildings, acquiring all the information we needed for the rooftops was quite complex."

Plate photography for the pullback was captured on the real set, with the camera mounted on a cable-cam and pulled straight back from the window some 60 feet. MPC then tracked the camera move and re-built in 3D everything that the camera could see. "We camera-projected the filmed plate back onto our CG buildings in order to capture all of the textures, and then continued the pullback with our CG camera. As we got into set top-ups — vertical extensions of the Fleet Street buildings that were on the real set — we added roofs and the pie shop chimney with smoke billowing out. Then, once we had this big pullback camera animated, we hand-placed all of the buildings; and when you get about two or three blocks back, it begins to turn into multiple layers of matte paintings, and in the distance just hills and sky."

Dramatic skies added just the right atmospheric

ouch to the shot. "Anyone doing visual effects for Tim Burton knows that getting a really good library of interesting-looking skies is one of the most important things they can do right at the beginning of the project. We probably spent more time trying out different skies on shots, looking for just the right composition and mood that worked, than almost any other element. In this instance, we ended up having it raining in the far distance, just off the horizon. If you look to the right, there are sheets of rain and a little flick of lightning, just to give it a slightly moody edge."

In a stark departure from the dark, moody look of the London environments, MPC also created shots for a bizarre fantasy sequence in which Mrs. Lovett imagines life with Sweeney in a series of idyllic family tableaux featuring the couple picnicking under a tree on Hampstead Heath, sitting on a sunny beach punctuated by soaring birds and painterly skies, and strolling along a picturesque pier by the sea. Burton wanted those shots to have a completely different, otherworldly feel to them, more impressionistic than photoreal, characterized by bright, super-saturated colors. "It was an element that was challenging for us because we felt as if we'd begun to really establish the kind of vocabulary needed for Sweeney Todd's world — and suddenly you're out of it. Suddenly, everything is different. It was difficult to reconcile that." Live-action for the sequence consisted exclusively of greenscreen photography of the actors integrated into all-CG backgrounds. "Nothing in those shots was real, except perhaps a bit of wood the actors were walking on for the boardwalk. We added the railings, extended the boardwalk in all directions, and added all of the people walking on it."

To save time, Jarrett opted to employ real ocean photography for the beach scene, rather than create wholly computer generated seas. "When we did CG water on the Thames, we could get away with it because it was quite calm and dark and misty. But this was broad daylight, with waves crashing against the beach. So we took a film camera down to Brighton, which is on the south coast of England, and shot lots of water plates off the pier. Then we used a camera projection technique to project all those water textures onto a big flat plane, added some displacement and rebuilt the water in 3D." The sandy beach was generated as 3D geometry, with matte paintings projected onto it.

Clever transitions from the heath to the beach and back again were filmed as one continuous shot, with no cuts. "We prevized those quite heavily. The first one was fairly simple, but the other was more complex. It starts with the camera looking down at the back of the couple sitting on a blanket on the beach at sunset, with the ocean and the setting sun in front of them. The camera cranes up and over the top of them in a big arc; and by the end of that arc, we're back on the heath and it's broad daylight. It was all pure greenscreen, with a lighting transition from sunset look to broad daylight look halfway through the shot. We framed it in such a way that as the camera was looking straight down on top of the actors, the blanket they're sitting on completely fills the frame — and that was our transition point."

When Sweeney's bloodlust reaches critical mass, what follows is a grisly orgy of murder and mayhem that literally bathes the screen in blood as the body count rises. Wound and blood-spurting effects were, for the most part, achieved in-camera with the help of makeup effects supervisor Neal Scanlan and his team. In addition, the prosthetics team provided corpse dummies for dropping down the chute to the bake-house, basing them on scans of the real actors provided by Gentle Giant Studios. MPC was called upon to make the blood appear more visceral and intensely red, and to embellish the practical blood effects in several shots. A digital approach was also employed for the film's grim conclusion in which Sweeney suffers the same fate as his victims, a veritable curtain of blood gushing from his own slashed throat. "That scene was a tough call. We were shooting chronologically, so it was at the end of the schedule, with all the attendant pressures. We'd discussed the idea of doing CG blood throughout that scene — on his neck, on his clothes and everything. But simulating fluid is complex — especially if it has to interact with cloth. So instead, I had the special effects team create a rig — a collar that went around Johnny Depp's neck and that would, on cue, let out enough blood to really soak into his clothes to give them that kind of glistening quality. Then we painted out the collar and completely replaced his neck, adding a CG wound and CG blood pouring out of it. Some of it included blood elements shot during postproduction on a green neck and comped in. Some of it was blood elements projected onto CG geometry and then warped into place. Not the most complex stuff, but I felt we could get a more naturalistic look that way."

Even more graphic were shots of Mrs. Lovett in flames, after the crazed and vengeance-obsessed Sweeney shoves her into the very oven the duo have been using to dispatch their victims. Jarrett and the MPC crew sought a delicate balance between realism and a slightly over-the-top sensibility in approaching

Judge Turpin (Alan Rickman) and his henchman Beadle (Timothy Spall) exit London's historic Old Bailey courthouse. Plate photography for the sequence was filmed on a stage at Pinewood draped entirely in greenscreen, with real stairs and a cobblestone floor serving as the only set dressing. Burton planned to use similar bare-bones sets for most of the film's exteriors and interiors, but ultimately opted for many full sets when he concluded that his actors would benefit from more tangible surroundings to ground their performances.

Digital artists integrated the greenscreen and motion control photography with an all-CG background — one of seven created by MPC for the show — that included a highly-detailed model of Old Bailey able to stand up to close scrutiny in the full-screen shot. Burton derived visual inspiration for the film from an assortment of old black-and-white horror movies, whose stylishly moody ambiance was replicated, even more richly, by the combined use of monochromatic settings, contrasty cinematography by Dariusz Wolski, and a digital intermediate process that stripped out most of what color remained.
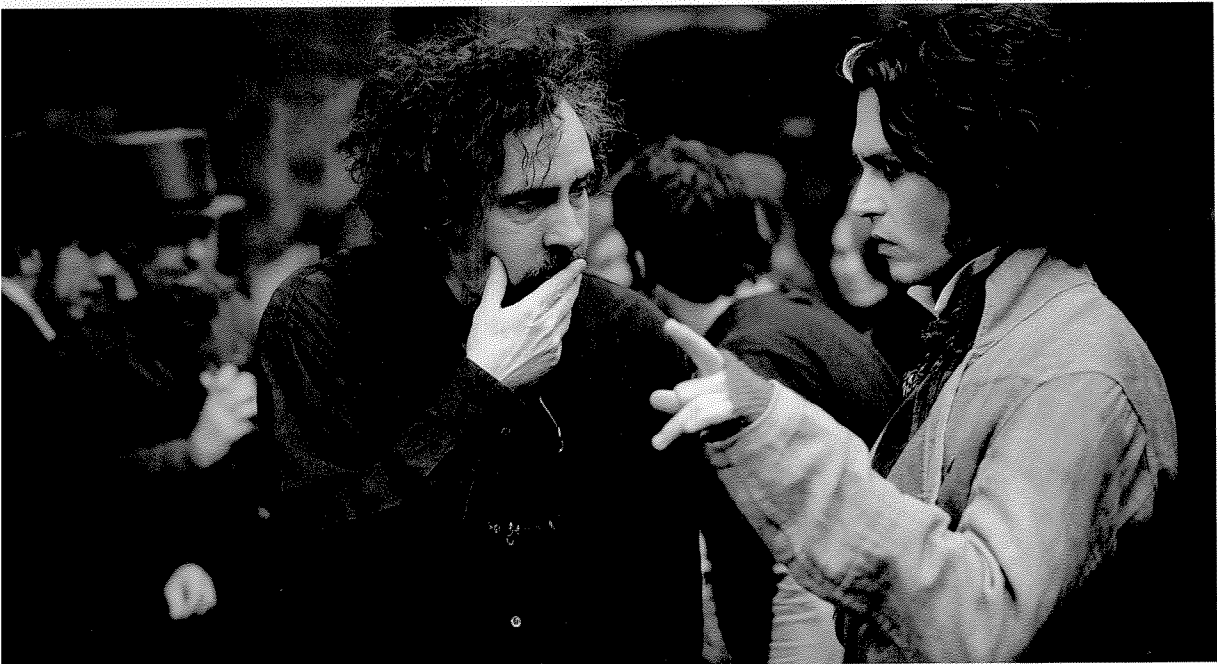
the sequence. "We didn't quite know how gory to go. Unlike the other shots, this was not about blood. It was more about blackening and charring. So we shot reams of reference — sides of beef treated with a blow torch to see what would happen to burned skin. In early concept images we did of Mrs. Lovett, all the skin was completely burned away, and you could see all the bones underneath. It was kind of comical; but just a bit grotesque, as well. So we steered away from that, and ended up layering in more fire so you just caught glimpses of her face."

Since the oven had no real fire in it, MPC was also responsible for all of the interactive fire effects in the shots. "We ended up shooting lots of fire reference. I had a dummy built — a full size mannequin of Mrs. Lovett — and after we'd shot Helena in the oven with just some interactive lighting, we got a cut sequence from editorial and took our mannequin, which had steel poles attached to the arms, legs and head — onto a blacked-out stage. Then we had the special effects guys pour various liquids and gels onto it and set fire to it, and we puppeteered the mannequin to do the same motions that Helena did, using a looping playback system on the set. We shot lots of that for two days, and ended up with a big library of fire footage that we could comp into the shot. It was nice because

you really got the sense that the fire was wrapping around her arms and properly interacting with her. The key was not to try to shoot all of the elements in one hit. We would set the right arm on fire and puppeteer that to match what Helena was doing in a certain shot. Then we'd set the left arm on fire and do the same. Then we'd set the chest on fire, then the face and the hair, and so on. So we'd have lots of different elements, with nine or ten takes of each for our compositing supervisor Marian Mavrovic and his team to pick and choose from."

Helping Tim Burton realize the world of Sweeney Todd was, for Chas Jarrett, a dream assignment. "It doesn't get any better than this. When you're working with Tim you always know that it's going to be really meaty, juicy work — full fat kind of stuff — particularly in this movie, because it's such a character-driven piece. Tim was great at keeping it focused on that. And in some ways, the London we created was like another character in the film. Its presence is definitely felt — not too showy or ostentatious, but small and gritty and claustrophobic, and Tim's vision for that was fantastic."