Unleashing CG Robots in the Real World

Starscream clears a path through traffic.

ILM's goal on *Transformers* was to achieve photo-realistic 30'-tall CG robots that had believable physicality, and visual-effects supervisor Scott Farrar worked closely with cinematographer Mitch Amundsen and director Michael Bay to ensure the careful integration of live-action cinematography with this CG work.

Farrar began by looking at how other sci-fi movies had incorporated robots. He found most had used an actual mechanical figure, like Robby the Robot in *Forbidden Planet*, or an actor in a costume, like C-3PO in *Star Wars*. "Robby the Robot was simple but it really worked, and C-3PO was one of the best-looking man-in-a-suit robots," says Farrar, "but the movies with *giant* robots were mostly done with very simplistic stop-motion animation."

Because the Transformers were to be composited into shots in post, Farrar used on-set reference devices to give Bay, Amundsen and camera operator David Emmerichs guidance. "I spent most of my time with Michael and David," says Farrar. "I'd recommend how wide they needed to be, or say, 'It's okay if you see part of the robot *here*.' They were always trying for messy compositions because that helps you believe the robots are really there. We were all thrilled when we saw the first shots come in."

Amundsen added touches such as interactive flares and shadows to help incorporate the robots into his photography. "There's an alley scene where all of the Transformers show themselves, and Optimus Prime rolls up to Sam and Mikaela," he says. "We shot clean plates of the alley, often shooting right into the BeBee Night Lights and getting flares. We'd create shadows and knock lights out with flags, knowing the shape would eventually be something else."

"Michael likes to have the camera moving, and in this film the camera is often rising and swirling around a robot," says Farrar. "So we'd dress the robots to the camera, with gears, wheels and pistons moving into position as the camera sees them. That made the transformations look more complicated and more real."

On the set, ILM relied on its longtime practice of extensive reference photography and notation to integrate its virtual camera with the live-action work. "Most important was getting the reflection of the environment each scene takes place in," says Farrar. "Our match-mover, Duncan Blackman, was on set with a digital still camera to photograph the surroundings for each scene. From that, we stitched together a 360-degree background sphere environment that could be reflected on the robots' shiny chrome surface.

"Michael didn't want clunky robots," he continues. "He had [stunt coordinator] Kenny Bates devise different styles of fighting for the different robots. We also looked at real-world physics and considered the weight and speed of something so big. On top of that, we needed to make the robots look cool. We had to walk a fine line, and sometimes we threw away the physics!"

Bay wanted to film all of the action involving the Transformers with as many real elements as possible. This approach proved especially successful during a freeway chase that finds Decepticon Bonecrusher smashing through a city bus, triggering an explosion. "That bus is real, all of it," says Amundsen. "The special-effects team spent a lot of time rigging the explosion. I operated the hero shot, and we were leading just 20 feet in front of that bus. When it blew, we thought the explo-

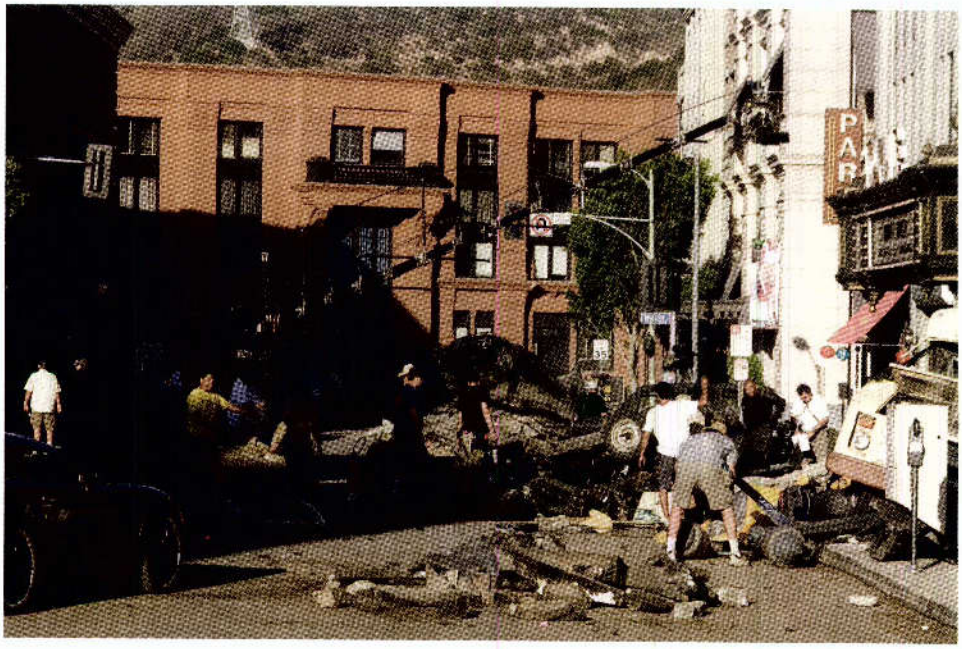
sion might catch up with us!"

Despite the project's reliance on CGI, the filmmakers found that practical iterations of the robots were occasionally useful. "The question was always, 'Can we get decent mileage out of it if we build it for real?'" recalls Farrar. "[Special-effects coordinator] John Frazier made a full-sized [16'-tall] model of Bumblebee, Sam's Autobot buddy, for a sequence where Bumblebee is tied down to a train car. His movement was restricted in this case because he was covered with a cargo net, and the model could be photographed multiple times." Also, a puppet for Soundbyte, a devilish stainless-steel Decepticon, was used for certain shots where the camera was up close or he wasn't moving around much. Finally, the lower part of Megatron's body was built practically in the government-facility set; they shot a lot of live-action material of the actors walking around those giant legs."

"At one point Megatron breaks loose," says Amundsen. "We had some debris flying around the set and tried to make it look like his legs were bending a little, but most of the big action was ILM's work. We didn't do much greenscreen or bluescreen because ILM was adding so much into all of our shooting environments, even through explosions and dust."

Adds Farrar, "For the final battle, we had layers and layers of dust, debris, fire and smoke, along with bullets and missile trails, and bricks-and-mortar chunks of buildings blowing off. All of that had to be simulated or shot as real elements and composited in. The city fight is dirty and messy, and making it all look real required incredibly complex work. A lot of pieces have to be put together to make everything look good in the end."

— Noah Kadner



Although much of *Transformers* was shot on location, several sets were built at the former aircraft hangars in Playa Vista that have played host to a number of studio productions. *Transformers*' stage sets included a secret government facility that holds Megatron while he is still in cryogenic stasis (from the Arctic prologue). "We built Megatron from the waist down and ILM added the upper half," recalls Ryan. "Michael wanted to be able to photograph the lighting units, so we built 12 Art-Deco-style lighting clusters, each consisting of six MolePars. Above Megatron I put eight Mac 2000 motorized lights, which we could quickly reset as keylights, downlights or backlights. On the day, we also used a couple of 10Ks, one as a key through a diffusion frame, the other as a hard edge."

Back on location, a huge freeway chase scene showcases Optimus Prime as he takes on a bus-swatting Decepticon named Bonecrusher. The filmmakers used a special rig, dubbed the "Bay-Buster," which was originally built for the director during *Bad Boys II* by special-effects supervisor John Frazier. "It's a ¾-ton truck driven by a stunt driver that has a cow-catcher type of attachment on the front and roll cages all around that house fixed remote cameras," says Tomita. "It can drive through anything and flip other cars and debris

Above: Crewmembers add some finishing touches to the chaos and mayhem on a street set. According to Ryan, "The challenge was preparing and lighting for 30-foot robots that weren't there on set." Below: The camera dollies rapidly to capture a dynamic shot of a special-effects explosion.