During take one of the shot, Lili Taylor, who plays Mrs. Perron, wasn't quite prepared for the breaking glass and had a genuinely frightened reaction to it. The director was delighted with her response but preferred the action that played out in a subsequent take. So Pixel Magic was charged with stitching the best of two takes together with painstaking rotoscoping and background replacement.

Another seamless VFX sequence from Pixel Magic opens the movie, creating from plates of the location and stage houses what appears to be a single Steadicam shot. It shows the Perrons driving up to the house on location, moving through the front door, traveling through the inside of the house on-stage, then moving out the back door and into the location house's yard.

Pixel Magic removed some of the scary from a shot where the possessed Mrs. Perron changes her physical features via prosthetics — contact lenses, veins, lips, skin treatments — then returns her back to normal. Artists used 360-degree photos of Lili Taylor's four stages of makeup and a digital head they'd made as a guide to help them paint her back to normal.

Pixel Magic also created a set extension in post for the rocking chair sequence to deliver a camera angle not captured on the set. "I photograph everything and take a lot of HDRI photos for lighting reference," says McIntyre. "We couldn't have created the digital matte painting needed to complete that scene without the photos we had — both my own and those from the on-set still photographer. We were generating a camera angle that didn't exist."

The company's toolset included The Foundry's Nuke and Adobe After Effects for compositing; Imagineer Systems' Mocha for planar tracking; Andersson Technologies' SynthEyes for 3D tracking; LightWave, Autodesk 3DS Max and Maya for animation; and LightWave, Cebas FinalRender and Mental Ray for rendering.

PACIFIC RIM

The ever-busy Industrial Light & Magic (www.ilm.com) created more than 1,500 VFX shots for Pacific Rim, a sci-fi film that honors kaiju and mecha genres while standing on its own as a unique film that director Guillermo del Toro has described as "operatic."

Set in the near future, international soldiers pilot giant mecha called Jaegers in a battle against monster kaiju invaders who have arrived on Earth via a Pacific Ocean portal. ILM's San Francisco headquarters handled the majority of the VFX shots, with its facilities in Singapore and Vancouver contributing to the fight sequences. Ghost VFX in Copenhagen, Rodeo and Hybride in Montreal, and Base FX in China also crafted shots; Virtuos was tasked with asset building.

“We did a variety of work — CG characters, matte paintings, set extensions and pure effects work,” says ILM VFX supervisor Lindy De Quattro. Although del Toro’s art department provided a starting point for the mecha and kaiju creatures, ILM’s aptly named art director, Alex Jaeger, worked with model supervisors Paul Giacoppo and Dave Fogler, as well as De Quattro and her fellow VFX supervisor John Knoll to refine the final look of the characters.

“We pulled reference footage of animals, from gorillas to crocodiles, to find weird eyes and other component parts for the kaiju,” which represent a wide range of species, she says. Del Toro also provided cultural references — from fine art, films and graphic novels — for inspiration.

The kaiju are “definitely unlike anything we’ve done before,” De Quattro says. “Each one is unique, and they all look, move and fight differently.” ILM animation director Hal Hickel spent a lot of time “developing specific movements for each character so they’d be threatening and ominous” and not merely huge and silly. The crab-like Onibaba had myriad small inner claws that had to be functional in a fight, for example.

On the other side of the fight card, del Toro didn’t want the mecha Jaegers to remind viewers of Transformers, she notes. “We decided not to use any motion capture; we didn’t want them to look or move in a human way. There had to be machines behind the action.” So animators used vehicles as references, including a lot of US and Soviet WWII tanks, and Alex Jaeger determined where the mechanics of a piston or ball joint would provide the movement required.

Like the kaijus, each of the Jaegers has a different personality. “They represent the countries on the Pacific Rim that have an emotional stake in the battle,” De Quattro explains. “The American Jaeger is a bit of a cowboy with a wide-legged stance and a swagger in its walk. The Russian one looks like Cold War technology; the Chinese one is more agile and adept at martial arts.”

Battle sequences take place in Hong Kong and at the bottom of the sea. Although ILM started with real Hong Kong location footage the digital settings had to be amped up in scale to accommodate the giant warriors. “They were so huge that they couldn’t walk down the biggest street in Hong Kong without knocking down buildings,” De Quattro notes. “So we split streets to widen them, if nothing else.”

Fluid sims were required for the ocean surface. With the Pirates of the Caribbean series and Battleship to its credit, ILM was “confident that we were in a good place with water,” she quips. But fluid sims for vast expanses of water are still time consuming and expensive to do. Water was “art directed” to create giant waves “that were physically correct but would get out of your field of vision” and not block the action that followed. Del Toro considers the film’s digital water its most exciting visual effect and has called ILM’s water dynamics “technically beautiful but also artistically incredibly expressive.”

Digital rain played a big part in shots as well. “Everything was wet all the time,” De Quattro says. “A lot of fights take place in the rain and a lot of those feature slo-mo sprays of rain flying off the surfaces of the Jaegers in a Raging Bull kind of slo-mo sweat moment. It really humanizes them.”

A pipeline for digital rain was developed to layer precipitation in shots, adding atmosphere and color, including the “beautiful super-saturated washes of rain” that del Toro wanted to show off the neon lights of Hong Kong.

ILM didn’t use quite so much of its in-house software for Pacific Rim. Instead it tapped Side Effects Houdini for its rigid sims pipeline, The Foundry’s Mari for texture painting, Nuke for compositing, Katana for lighting, and Arnold, Chaos Group’s V-Ray and Pixar’s RenderMan for rendering. ILM retooled its pipeline to accommodate the additional data per layer that the show’s deep compositing demanded.

De Quattro says it was fun working with del Toro, who proved to be an “inspirational” force. “He’s such a fan of filmmaking, of the genre, of ours! His enthusiasm was very contagious — the whole crew caught it.”

During the production of Pacific Rim SIM Digital/Bling Digital in Hollywood (www.simdigital.com) handled the front-end workflow at the Pinewood lot in Toronto, providing camera support, DIT equipment, the Avid offline set-up and building out a custom data lab.

“One of our permanent data labs was nearby, but they wanted their own data lab within the production offices, so we built a system tying together the data lab and dailies room for the offline and VFX editors,” explains Chris Parker, chief technical officer for SIM Digital. “We also tapped into Pinewood’s internal network so, from the stage floor, production systems supervisor Ben Gervais could set the looks for the dailies with DP Guillermo Navarro and transfer them through Pinewood’s network to the data lab.”

Early on it was determined that a purpose-built system would best serve the film. It needed to handle data management and all dailies processing, which encompassed setting the looks, managing the color files, processing the files to Avid-friendly specs, transferring them to Warner Bros.’ internal screener system and doing VFX pulls.

Since Pacific Rim was largely a stage-based show the director wanted to get footage to the editors quickly. “At the end of the shoot day, del Toro wanted the offline editors to start working on cuts with that day’s footage. So we tied the data lab to offline and VFX editorial to tighten the turnaround,” says Parker.

SIM Digital supplied several Blackmagic Design DaVinci Resolve dailies workstations, several Avid workstations and separate ISIS shared storage, all tied together, for dailies and data to promote ease of use and enhance security. Ben Gervais wrote custom scripts for the VFX pulls that efficiently sourced shots in the master file and transcoded them to ILM’s specs.

When shooting wrapped, del Toro remained in the Toronto production offices, working on his director's cut. But when it came time for him to move back to LA for a screening, the question of how fast SIM Digital could move the Avids came into play. The solution was to build a mirrored system for del Toro in LA.

"He was cutting in Toronto, took a plane to LA and picked up where he left off," says Parker. "Then editorial shifted to the LA post production offices, which we continued to build up after they decided to post-convert the film to 3D — we beefed up offline by adding 3D Avid workstations and screening monitors."

Parker notes that it was important to come to Pacific Rim with "no preconceived plan. We wanted to hear what the show was all about: locations, stage, cameras, editorial needs, ILM's needs. With a blank slate and a lot of discussions we were able to build out a system specifically for their needs. Ben Gervais and dailies producer Jesse Korosi were instrumental in the design and implementation of this purpose-built system."

The system helped del Toro "get into offline faster than he ever had before," says Parker, and it enabled DP Navarro to "maintain a comfort level and apply his immense talents to his first major digital project. By all accounts it was the best [front end] experience they've had; it allowed them to shift from production into digital post seamlessly."

WORLD WAR Z

Hands down the go-to company to record massive zombie swarms is Audiomotion Studios (www.audiomotion.com), the Oxford, England-based motion capture provider, which gained its undead expertise working on World War Z.

Audiomotion deployed 160 of its Vicon cameras on location at Shepperton Studios, creating one of the world's largest-ever motion capture stages. The 50-by-85-foot volume was used to capture hundreds of stunt moves later transformed by The Moving Picture Company and Cinesite into thousands of frenzied digital zombies.