

INDEPENDENCE DAY: RESURGENCE

Ian Dean meets Image Engine's *Martyn Culpitt* to discover how their epic VFX brought the alien invasion back

Epic is a word that crops up a lot when talking with Martyn Culpitt, VFX supervisor with Image Engine, who were responsible for creating 170 shots for Independence Day: Resurgence.

It comes as no surprise, given director Roland Emmerich's track record of grand-scale destruction, and Image Engine's successful collaboration on the same movies, White House Down and 2012, we'd expect nothing less than complete and utter global chaos.

"Very ambitious; the movie is epic!" exclaims Martyn. "The scale of the shots is absolutely huge. There are so many different pieces that are needed for each shot. A lot of the work we did was with the actors on blue screen plates, so it was a lot of work to create the full-CG environments that surrounded them."

Complex environments

One sequence, the "epic escape sequence," as Martyn describes it, tasked Image Engine's 120 artists to create a CG environment that was 1.5km in diameter (nearly 1 mile) in which the heroes find themselves on a huge platform inside the alien mothership.

"The pilots themselves were shot on blue screen, and we created the whole platform as a full-CG asset, which included alien fighter ships, entrances to the platform, and a full control tower for the aliens," explains Martyn. "There were also several alien columns in the background that added to the depth and scale of the scene."

Marytn explains how the sheer scale of these environments offered the biggest challenge to the team, coupled with the pressure that so many shots were being created around these assets. "The environments were so big that we needed so much model detail and depth to sell them and have the audience really believe the actors were there. It would be fine if we only had one big environment, but we ended up having three!"

As well as the alien platform escape shot, Image Engine worked on the expansive prison sequence where hundreds of aliens are being held in cells. "We created the full CG prison asset including everything that surrounded it, then put the alien colonists into the cells. We also integrated the colonists into live-action plates, having them interact with the human actors," says Martyn.

Tech savvy

New technology, software and pipeline developments came to the fore to ease production and sell the environments as real, living places. Scheduling and tracking was done using a customised version of Shotgun, as well as the studio's core technology Gaffer/Cortex, and asset management system Jabuka.

Martyn says: "A lot of effort was put into simulating both water and foliage. Rendering volume also went through several rounds of optimisation. We also developed a workflow for creating laser effects in comp, driven by animation point cloud data."

While Maya was used for asset building and animation, look dev and lighting were done in proprietary software Caribou, and compositing

Image Engine worked on the VFX for Independence Day Resurgence for over a year, "from pre-production and being on set, up until the final shots were out of the door," says Martyn Culpitt

ONE OF THE MOST IMPORTANT THINGS WHEN DEALING WITH CHARACTERS IS THE FACE; IT'S AN INSTINCTIVE THING TO LOOK AT THE FACE OF ANOTHER HUMAN OR ANIMAL

Martyn Culpitt, VFX supervisor at Image Engine

"We used forward path tracing in 3Delight to render the show. We've had a lot of success with this RenderMan-compliant engine on previous projects. We did not test alternatives for this project specifically, but we periodically benchmark to identity areas for improvement," says Martyn Culpitt

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Martyn Culpitt, VFX supervisor at Image Engine

was done in Nuke. For the FX, Houdini 15 came into its own, along with OpenVDB for caching data for the lighting department.

Image Engine carried out a lot simulations and effects work for the 'Foliage' sequence, in which aliens and pilots interact in a murky, watery environment set inside the alien mothership. The pilots are walking through waist-high water amongst alien plant life while trying to escape from pursuing alien soldiers. Shot on blue screen, Image Engine created a full-CG environment.

"This [shot] included large water sims that were driven by the actors' and CG aliens' movements as they waded through it. The water sims also interacted with floating surface plants and thousands of plants growing in the environment," explains Martyn. "We also had surface fog that was driven by the actors and aliens. It ended up being a complex scene with varying FX sims and elements that brought it to life."

Creating depth

With so many elements and layers bringing the sequence to life, it's little wonder that the Foliage sequence is Martyn's favourite: "I really love the look and atmosphere; it's dark and moody and there is fog everywhere. It feels like you're in a cross between a cornfield and a swamp at night."

The sequence also ticks the Epic box. In total there are over 500,000 plants in the sequence of varying size and scale, with

The alien mothership was a huge undertaking for the team at Image Engine, who created the vast platform in great detail

CREATURE FEATURE

The aliens are back with the slobbering chops and tentacle bits, but this time, they are entirely CG...

"I was a big fan of the original movie," says Martyn Culpitt. "I still remember seeing the aliens for the first time and how scary and intimidating they were. There was that one moment were the aliens push the president up again the glass: it was awesome!"

That love of the original movie impacted on how creatures would be treated in the sequel. There are new aliens, and new ways to shock the audience.

"I loved how Roland [Emmerich] played with only seeing glimpses of the creatures; it really helped put you on the edge of your seat. In ID2 there are similar scenes where you get fully immersed and then there's a big jump! It has that same sense of atmosphere and pacing, which is great," explains Martyn.

Adhering to the feel of the original movie's creature movement when bringing these creatures back to cinematic life as CG characters was important. "The animation team did a fantastic job on the movements and really stayed true to the original movie, especially when it came to the tentacles and the way they whip around," says Martyn. "It was important for Roland to have that connection and familiarity with the original movie."

some alien plants standing 24-feet tall, and all simulated in water, covered in fog, with volumetric lights and buzzing insects.

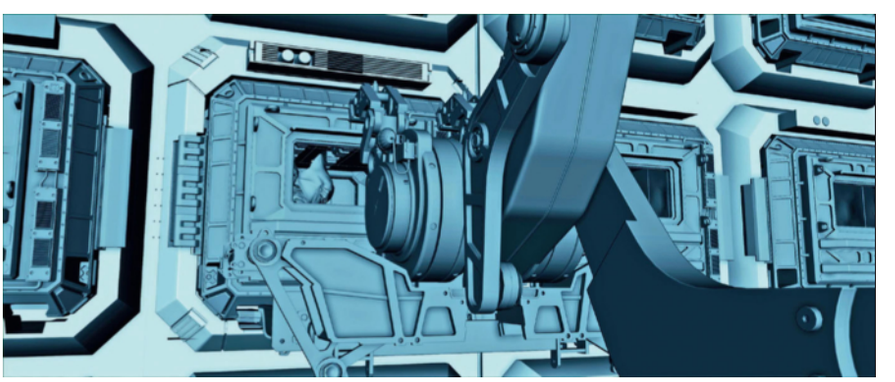
Going large

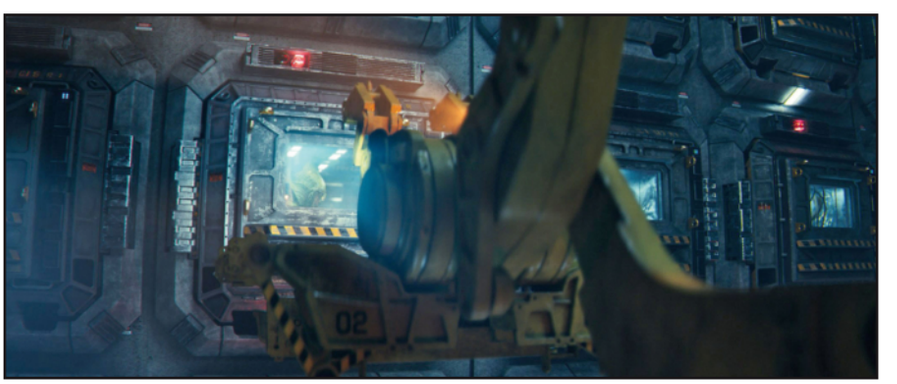
A dedicated team and R&D department solved problems, and rendering pushed the 700 HP workstations (25,000 core) to its limits.

"It was a huge scene and complicated to get all the pieces to come together… The FX sims and look dev also make the sequence come to life with so much depth. I think it's pretty amazing; the team did an incredible job," adds Martyn.

To achieve such epic design, Image Engine's producer Shawn Walsh had began talking to Marc Weigert and Volker Engel from production studio Uncharted Territory in 2013. Roland Emmerich was hands on when production started.

"Roland was great to work with," says Martyn. "[He] was very open to our ideas and concepts for various shots and sequences." Image Engine's in-house concept artist, Rob Jensen, sat down with Martyn to brainstorm ideas. "Rob and I got into a really good groove, learning what Roland liked and didn't like. In the end we had such a solid grasp on what he wanted his film to be, as he is so clear





"Roland was great to work with! He has a really strong vision and knows how to achieve it," says Martyn Culpitt. "We created lots of different layouts and blocking anim scenes to show him, and once he liked something he didn't change his mind. He knew what he wanted and once he got it he stuck with it"

"I think there is pressure on any project," says Martyn Culpitt. "That said, I don't feel like we needed to live up to any other films out there: ID2 will stand for itself. The VFX work looks great and the movie has such a strong following"

The epic scale of the film pushed the Image Engine team, so even simple models, such as this alien harvester for the key crash scene, were massive and larger than life. "This harvester model was 160 meters long (525 feet), 45 meters wide (147 feet), and 36 meters tall (118 feet), and an alien troop transport that housed hundreds of alien soldiers," says Martyn Culpitt

and communicative. Very rarely would he change what we presented; it was a great collaboration."

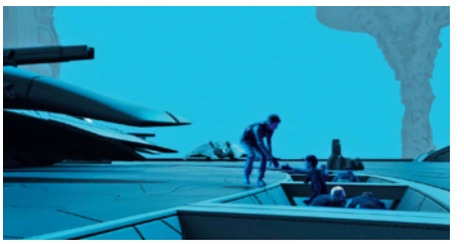
It's a relationship that helped when Image Engine turned its attention to creating the aliens, as 96 of the allotted 170 shots were creature focused. All but the Queen (created by Weta Digital) were handled by Martyn's team, and these fell into two groups, colonists and soldiers.

Creature work

A lot of time was spent reviewing the first Independence Day movie to closely study what Roland had done. The team had to make sure they kept the first film in their minds when dealing with the animation and the overall look and feel of the characters. "One of the first things Roland said to us was that he loved the feel of the tentacles from the first movie, and that he wanted our CG characters to have the same sense of energy and life," says Martyn.

Time was spent in R&D creating new animation rigs and systems to get the alien tentacles working with the same physicality as the original film's puppets.

"In the end we created a pretty amazing rig that could use dynamics, and then switch



"This was a huge build for us as it was so big in reality: roughly 1.5km (nearly 1 mile) in diameter. We also had to work in complex interactions, such as the pilots interacting with the Alien soldiers on the platform as they attempted to take control of alien fighter ships to go and battle the Queen," says Martyn Culpitt

and blend to then having full control over the tentacle," says Martyn.

The animation team used a mix of motion capture and extensive keyframe work to achieve the right feel for these alien characters, one which has many layers of animation and depth to the performance.

Alien animation

"We took a lot of time to refine the facial animation and model shapes so that the face really came to life. I think one of the most important things when dealing with characters is the face; it's an instinctive thing to look at the face of another human or animal," explains Martyn. "Therefore, if you get the subtleties and nuances working then the audience will fully believe it. There is a shot in the movie where we come extremely close to an alien colonist's face and you can see the nostrils flaring and other breathing shapes in the face – it's scary because it feels alive."

The modelling and look dev on the characters was vital to sell the work. On the original movie Roland Emmerich spent a lot of time creating the full-scale models as props, adding subtle details into the puppets.

THE TEAM PAINSTAKINGLY REFINED THE MODELS SO THEY'D HOLD UP TO ANY LEVEL OF SCREEN DETAIL, FROM EXTREME CLOSE UPS TO WIDE SHOTS

Martyn Culpitt, VFX supervisor at Image Engine

"We had to do the same for our digital characters," says Martyn. "The team painstakingly refined the models so they would hold up to any level of screen detail, from extreme close ups to wide shots. Then look dev took over and added all of the textures and shading. This was a complex task as there was a lot of subsurface detail needed, so getting the subtleties in the colours and shading took time. In the end I think the assets look amazing and really held up to any shot we put them into."

As well as fine-tuning the colours and shading, the team had to work hard and be precise with the lighting, otherwise the alien characters wouldn't come to life and wouldn't be terrifying.

"If the lighting isn't right, then they just don't work. The team spent a lot of time dialling this in for each shot, ensuring we got the right sense of shape on the creatures. Roland wanted the aliens to feel scary and dark, so you only got brief glimpses of them. Not over-lighting them really helped with that: seeing only part of the face or body is way scarier than seeing the whole character!"

To ours eyes, the look is spot on with what we've seen from Roland Emmerich's seminal 1996 film, but with this feature, the director's gone epic: things that just weren't possible in the first film due to limitations in VFX and technology, he's now able to imagine and achieve, such as the giant mothership.

FYI *Independence Day: Resurgence is out now in cinemas.*