

Image Engine
(www.image-engine.com)
Vancouver, British Columbia

Autodesk® Maya®
Autodesk® MotionBuilder®

Maya is a flexible, powerful animation pipeline that can be used to rapidly respond to changes in creative direction during movie production or from one project to the next.

—Shawn Walsh
Visual Effects Executive Producer
Image Engine

The Prawns of District 9

How Autodesk Maya Helped Image Engine Make Alien Creatures an Everyday Reality



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Summary

Given the sophistication of today's sci-fi movie aficionados, it's an especially tall order to mesh alien creatures into the fabric of the world as we know it. In the case of *District 9*—Producer Peter Jackson's riveting Summer 2009 sci-fi action movie—the aliens are startling bipedal, insectoid creatures with tentacle mustaches, scales and bug-like eyes, who move with lithe, razor sharp alacrity despite their lanky, seven foot size.

But rather than creating an extra-terrestrial world that suspends one's beliefs, *District 9* Director Neill Blomkamp asks us to believe that these creatures, known as prawns, are living right among us in a recognizable setting—the present day Soweto section of Johannesburg, South Africa. And this extraordinary, suspenseful drama unfolds in a documentary news style—intensifying the need for credibility and realism.

When the animation/visual effects work for *District 9* was awarded to Image Engine, the company was ready to take on these daunting challenges with a creative pipeline based on the powerful, feature-rich 3D animation environment of Autodesk® Maya® software.

Image Engine's 100-member visual effects team relied upon Maya as the primary tool to help us model and animate creatures before compositing them into over 300 visual effects-laden live action scenes within the movie's ambitious production schedule and tight \$30 million USD budget.

The Challenge

"Neill Blomkamp presented us with an amazing challenge—to take something completely foreign and seamlessly insert that element into a handheld video piece that captures dramatic, almost bizarre, events in a very raw, unpolished style," said Shawn Walsh, visual effects executive producer for Image Engine. "He wanted the aliens to be so credible that people would simply accept them and the premise right from the start."

After their spaceship arrives in the skies above South Africa, over a million prawns find themselves confined and exploited in a dilapidated slum known as *District 9*. While they possess advanced weaponry, they're in a struggle against their human oppressors. A heroic prawn known as Christopher Johnson tries to repair their mother ship to return to his home planet in search of help for the others marooned on Earth.

"Since the creatures speak only through clicks and buzzes, their facial expressions are critical to conveying the story. Giving them believable emotion was a huge challenge because their faces do not look anything like a human's. So we had to build procedurally-driven facial rigs that would help the creatures mimic human emotions while preserving their distinctive alien look," said Jeremy Mesana, lead animator and animation technical director for Image Engine.

“To do this, we wrote many dynamic simulations for the facial rigs that would facilitate and even automate the animation of their facial expressions, like the movement of their antennae and tentacles,” Mesana added. “The creatures have bright skin colors and textures inspired from the insect world, so it was a challenge to make them look realistic against the subdued Soweto landscape.”

In principal photography, actors wearing grey suits served as stand-ins for the computer generated (CG) creatures. Later, compositors painted them out while the animation department used their positions and performances as a reference for compositing and tracking the CG creatures into those plates. All the creatures were principally animated using a combination of keyframing, rotomation and other animation techniques available in Maya and Autodesk® MotionBuilder® software so they could move in many ways humans couldn't do, like leaping off a roof.

Motion capture data captured from actors wearing motion sensors helped animate the secondary CG creatures. Also, the characters' clothing was simulated with Maya nCloth. Some scenes had nearly 50 3D CG characters, while one shot mixed 3D and 2D creatures to give the impression of a sea of creatures crowded on their spaceship.

The Solution

“Since every visual effects movie is different, with its own unique set of creative and technical challenges, it's rare that one software package can perform nearly every task you need done right out of the box,” said John Haddon, Image Engine's lead R&D programmer. “Maya software's C++ API and support for the Python scripting language enable us to extend the existing toolset with additional plug-ins, programs, and processes, while still preserving a unified workflow,” Haddon said.

Haddon and his team wrote code to help bridge Maya to the 3Delight rendering system from DNA Research, which was used for all rendering on the show. Jeremy Mesana wrote tools to better support motion capture data received out of MotionBuilder, something Image Engine's pipeline didn't have at the start of *District 9*.

And Nigel Denton-Howes, Image Engine's asset lead, developed a proprietary digital asset management system called Jabuka that leveraged the Maya file referencing features.



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“The ability to extend Maya by creating in-house custom tools is pretty essential throughout our entire animation pipeline,” said Denton-Howes. “We couldn't have met the needs of this project as quickly or effectively without that capability.”

The Results

“Maya is a flexible, powerful animation pipeline that can be used to rapidly respond to changes in creative direction during movie production or from one project to the next,” Walsh said. “We chose Maya over five years ago because of its openness, ease of use, and broad user base. Since then it has been developed and has evolved into a very strong animation platform.”

On *District 9*, Walsh added, “Maya was put to the test and its toolset used to the fullest. Maya modules worked together, including modeling, animation, dynamic simulations and particles. What we output from our Maya pipeline combined with our custom code base is what viewers see on the screen. We used Maya to help meet this daunting challenge; to put alien creatures in a real world setting to tell an incredible story in a credible way.”

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