Maya and Stereoscopy Add a New Dimension to Animation.

DreamWorks Animation SKG Develops a Stereoscopic Pipeline with Maya for Monster vs. Aliens.

> The fastest method to conceive a 3D space, get the ideas down, allow the artist to see spatially and review shots—is in Maya.
>
> —Phil McNally
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Summary

DreamWorks Animation SKG is devoted to producing high-quality family entertainment with the use of computer-generated (CG) animation. Overseen by CEO Jeffrey Katzenberg, the studio's vision is to create immersive experiences for audiences and tell the best stories possible through technical and artistic innovation. DreamWorks Animation became the first animation studio to produce and distribute two CG animated features in a single year (2004), including *Shrek 2*, the fourth highest domestic grossing movie of all time. Considering that it takes on average four years to make an animated feature film—and that DreamWorks Animation has committed to producing all of their projects in stereoscopic 3D starting in 2009—the studio has been evaluating the best methods and products required to add a new dimension to their animation.

The Setup

Mr. Katzenberg has been an early advocate of stereoscopy and the potential it represents for animation. *Monsters vs. Aliens*, DreamWorks Animation's first feature film produced entirely in 3D, is slated for a domestic release date of March 27, 2009. In order to fully exploit the creative potential of the stereoscopic palette, however, the company's artistic and technical teams needed to determine the range of stereoscopic 3D tools required to author films in 3D. Consequently, DWA has developed a whole new pipeline around stereoscopic films, with Autodesk® Maya® software playing a prominent role. The studio collaborated with Autodesk to develop a camera module for Maya that will be used on *Monsters vs. Aliens*.

"Having come over from Disney, I arrived at DreamWorks Animation roughly fourteen months ago and right away I was presented with the idea of authoring in 3D—which is entirely different than doing 3D as a post process after a film has been created," says Phil McNally, Global Stereo Supervisor for *Kung Fu Panda*. "Understanding what 3D authoring means to storytelling is a priority with Jeffrey [Katzenberg], so he wanted us to take the most challenging sequence we could find from *Kung Fu Panda* and re-author it in stereo. We chose to utilize the Tai Lung escape sequence as that test. In its original form, it tested all of the conventional wisdom around stereoscopic 3D. Since the film was already in production using in-house software, we had to brute-force it a bit to get the job done, which we wouldn't have had to do with our current Maya setup. We literally had to go back to the drawing board and re-invent how it would have turned out, with our current knowledge, had it been authored in 3D. Then we made comparisons between the two versions to determine what tools we were going to need for future projects like *Monsters vs. Aliens*."

Autodesk

3D is one of the most powerful effects in cinema, but, until recently, its storytelling benefits have been tangibly minimized by film makers who have relegated the technology to visual gimmicks. McNally looks forward to the day when he can work on a 3D film and the poster created to market it doesn't include "In 3D!" "With the arrival of digital cinema, we've been able to overcome the technical hurdles that have historically been problematic with 3D, confining its use to gags," he elaborates. "Going forward, the strongest use of 3D will be the engagement between the audience and the character(s), as well as the world they're in. 3D will support and enhance the story rather than override it, so the viewer will emerge from the theater feeling that they were more in that world, which can't be achieved with any other media. Ultimately, stereoscopy will become so familiar to audiences that 2D films will seem to them how black and white films seem to us now—in essence, a crucial element, or dimension, is lacking."

The Challenge: Seeing the Whole Picture

"With stereo, size matters," McNally explains. "When you judge stereo on a standard monitor, you're going to get a reduced effect. Then, when you go to a 40-foot screen, let alone IMAX® screens, the stereo effect expands and literally scales up to the screen size. Keep in mind the human eye can only process so much so quickly. So artists must develop an understanding of how their work translates to a big screen, and learn how achieve the desired balance. Maya saves us a lot of time in this regard. We can develop more tools within the Maya interface, allowing us to accurately measure the three-dimensional changes we're making. Something that is vital to 3D authoring is being able to see what you're doing—being able to see in 3D while the artist is setting up the camera shot is essential—and we can only do that in Maya."

He continues, "We've developed tools in Maya that allow us to measure distances in a scene and translate them into pixel separation, which is how the stereo effect is created in the theater. Once the animation has been created, it's like having actors re-perform the shot exactly, over and over again, as we experiment with the camera and stereo settings. We can re-shoot scenes in a way you could never manage with live action, and we can control the cameras because, at the end of the day, they're purely mathematical coordinates. Once we're satisfied with the camera movements, we can use the environment of our shot to determine data on distances—what I call 'stereo volume'—and relay them to the artist."

"Stereo is not a separate thing from 'camera' so 3D film making is camera work," McNally emphasizes. "When looking at a shot, you have to decide how to balance the lens you're using with camera movement(s) and set the appropriate stereo parameters...in other words, the stereo 'rig' or the combination of two cameras. In Maya we're able to create a stereo rig that has parameters set specifically for the character, and a different one for the background or other objects in the scene to ensure a comfortable setting. This helps us accommodate a director who really wants a long-lens (50 or 70 mm) composition without compromising the volume, or the juxtaposition of roundness and flatness, of the character. Maya enables us to keep track of all the pertinent variables like the nearest object, the farthest object, relative distances, and helps us determine

whether they are within the stereo parameters we've decided are comfortable for the audience. All of this data can then be fed back to the artist so they know what to change to get the desired shot."

The Result

With such vision and determination with regard to 3D authoring, one can't help but anticipate DreamWorks Animation's future applications of stereoscopic content created with Maya. Says McNally, "We need to transition from conceiving, creating, and projecting in 2D to being accustomed to doing them all in 3D. We need to develop ideas in a three-dimensional context with our stereo camera, and the fastest place we've found to do this is in Maya. Also, authoring in S3D is something you need to keep in mind throughout the

production pipeline, through compositing, editorial, and grading. You cannot solve all issues in one place. Autodesk has taken a holistic approach with tools for all these purposes, and I am glad we are collaborating further to enhance the stereoscopic toolset".

"For example, by using Maya at an early stage we can conceive multiple approaches to a shot, try different camera angles and pans, build virtual (and less expensive) sets, determine the best spatial composition, see ideas develop in front of us, render out shots to our pipeline, run a full 3D sequence on our big screen, do motion capture of camera data, move a virtual camera around a virtual world in 3D—all on the fly. Apart from that, Maya is rubbish!" he jokes, with a wink and what could only be described as an animated laugh.

Either on our own or in concert with Autodesk, we can develop tools in Maya that specifically address the challenges of stereoscopic 3D. Maya gives us that intuitive flexibility, or the ability to see what we're doing—while we're doing it—in 3D.

—Phil McNally
   Global Stereo Supervisor
   DreamWorks Animation SKG

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