GNOMON SCHOOL PRESENTS

HIGHEND MAGAZINE

Linkin Park

KORN: The CG Footage

Lighting & Rendering
in MAYA

The Lord of The Rings
a contributing artists' perspective

Global Illumination and Final Gathering using
SOFTIMAGE/XSI

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Greeting

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Call for Writers: If you think you are qualified to write for Highend Magazine E-mail us at writers@highendmag.com

Welcome to Highend Magazine presented by Gnomon School of Visual Effects. We would like to introduce you to a new direction for a high-end magazine dedicated to professional artists. As many of you may know, the idea of Highend Magazine has been around for years. My name is Will McCullough and I am the creator of highend3d.com, as well as an artist who has used Alias, Maya, Softimage, Flame and Shake. I am also one of the directors of the magazine. As my brainchild, Highend Magazine started with a call to Alex Alvarez and ended up as meeting at Gnomon School of Visual Effects in 2000 with a room full of industry professionals. The concept: Take what Highend3d.com lacks, add what knowledge Gnomon instructors have, and build a magazine dedicated to industry professionals. Almost three years later we have done it, collaborating with DMG Publishing, who has a history of producing quality publications and providing excellent customer service.

Our inspirations include Cinefex magazine, Wired, Inc, and other unique, targeted publications, including, for those of you who remember, the old Alias Assist, as well. For features we will take you behind the scenes on well-known productions. We will focus on application specific problems, solutions, tips & tricks, so, not only will you get insight on how the production was done, but you will learn "how to" use specific applications. In each issue you will also find beautiful high-resolution print images of inspirational work.

What has ended up a magazine directed by three industry professionals and artists, Alex Alvarez, Darrin Krumweide, and myself, whom we feel have a unique understanding of what makes a cool magazine. Our goal with Highend Magazine is to educate, entertain, reveal, inform and inspire. We have set out to do this – not for money, not for marketing, not because of any of us have extra time to kill – but simply for the love of the creation of digital art, visual effects, and a love for our industry. Just like Highend3d.com, the community dictates what we cover. We will be flexible, we will listen, we will learn, and we will continue to try to create a magazine that fits YOUR needs.

We appreciate your support and look forward to creating a magazine that meets all of our expectations. We need your feedback to accomplish this, so please email us at feedback@highendmag.com with your ideas, suggestions, or comments.

Sincerely Will McCullough, Editor
on behalf of Alex Alvarez and Darrin Krumweide, Editors

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HIGHEND MAGAZINE

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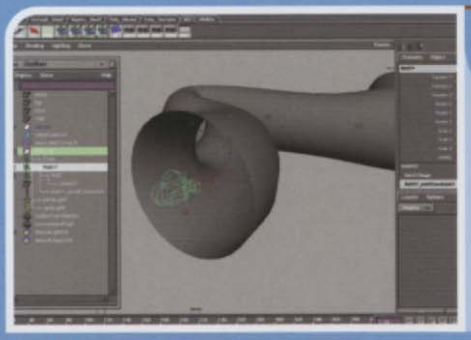

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Bringing it together

"In The End"

by Andrew Orloff

You Have To Start Somewhere

"Has to be cool. No, more than cool... majestic!" That's what Nathan "Karma" Cox said to me in the first creative meeting for the Linkin Park music video for the hit single "In The End." Ambitious doesn't even begin to describe what Nathan had in mind for the video, which was over 100 shots of CG set extension and full virtual environments including characters and effects. The video would be shot in just two days and the entire post schedule would be six weeks from design to delivery. As the visual effects supervisor, I would be involved in the process from start to finish, along with visual effects producer Ryan Thompson of 525 Studios and producer Matt Caltabiano of Anonymous Content.

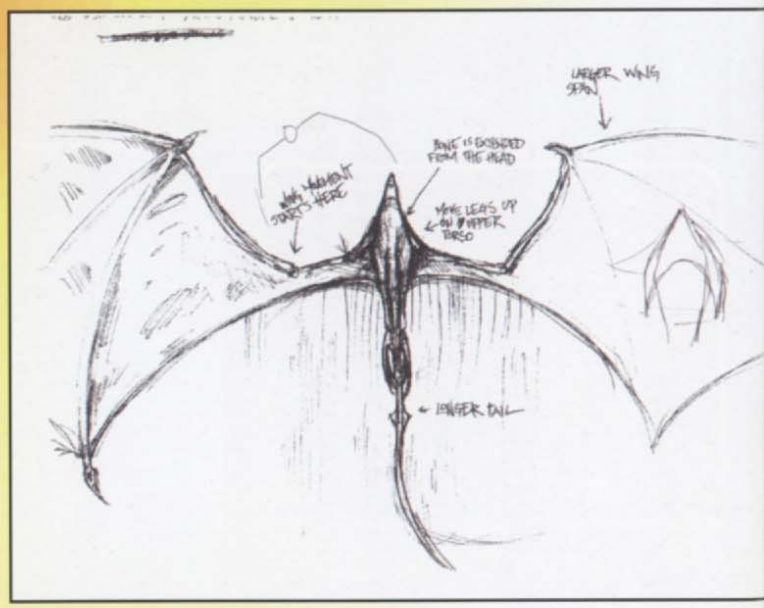
In this first meeting, Nathan unveiled his vision for the video, illustrated in part by color renderings by Joe Hahn (the band's DJ and co-director of the video). Nathan explained that members of the band would find themselves transported into a surreal yet completely naturalistic environment. Throughout the video, the cameras would return to the band's performance on top of a 500-foot high statue towering over an infinite desert, but they would also capture the band's interaction with the features of this bizarre universe. For example, the camera would focus on Mike, Linkin Park's M.C., as the desert spring to life around him. Vines would grow and die around his body; and finally the desert, we transformed into a lush green Valley.

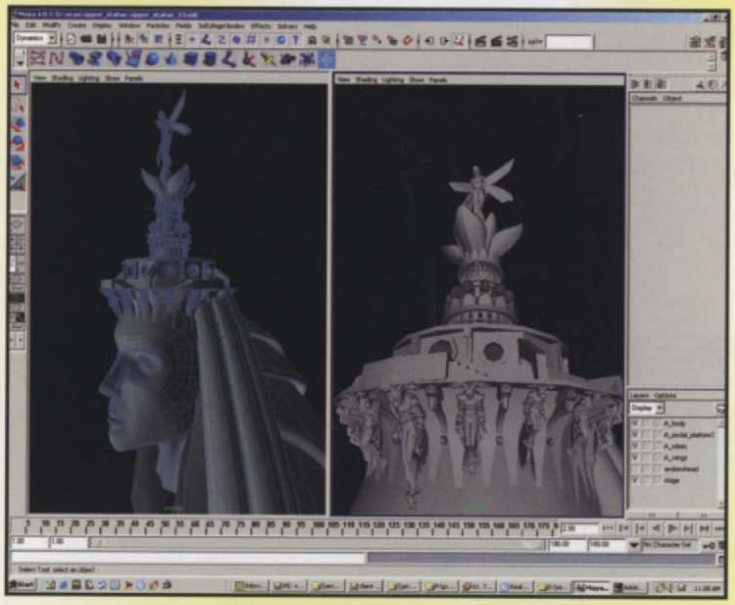
.To make this environment come to life, we decided that our approach would have to focus heavily on 3D. Given the complexity of Nathan's vision, some special preplanning would be necessary before the actual shoot, including meetings with a production designer and then CG pre-visualization of the finished product. These additional steps were especially important because Nathan planned to use a Super Techno Crane (a specialized camera crane that allows extremely fast and fluid camera motion) to shoot a good portion of the video. Fast and fluid camera moves make for particularly difficult tracking in 3D.

Our production designer was Patrick Tatopoulous, whose credits include Dark City, Stargate, and Godzilla. Based on the original concept produced by Joe, Patrick immediately began to create very detailed drawings of the 500-foot statue, since this structure would anchor the desert environment envisioned by Nathan.

Patrick combines a great sense of design with a thorough understanding of the mechanics of CG animation. Throughout the design stage, he built all of his set pieces so that CG extensions could be added easily. For example, since the band's "stage" was to be the crown all the statue's head, he split the crown into sections separated by architectural dividers. This innovation let me concentrate my CG efforts on making the statue look awesome instead of spending hours generating a CG floor that would match up to one shot on film.

After our consultation with Patrick, we conducted the pre-visualization, based on detailed storyboards for each shot. First, I set up the scenes using Alias/Wavefront's Maya software, since it has the ability to customize the user interface streamlining the production process. Next, I generated models with Poser for the band members and the





statue and modeled rough geometry in Maya to flesh out the scene. Nathan and I used these models to play with different camera moves, lenses, and set scales before the shoot and then, once completed, cut it into the Animatic with the storyboards. The Animatic served as a guide on the date of the shoot that the director and DP used as a point of reference.

All of this and the real work hadn't started yet! It may seem like a lot with such a short time in which to get all the footage we needed and no chance of

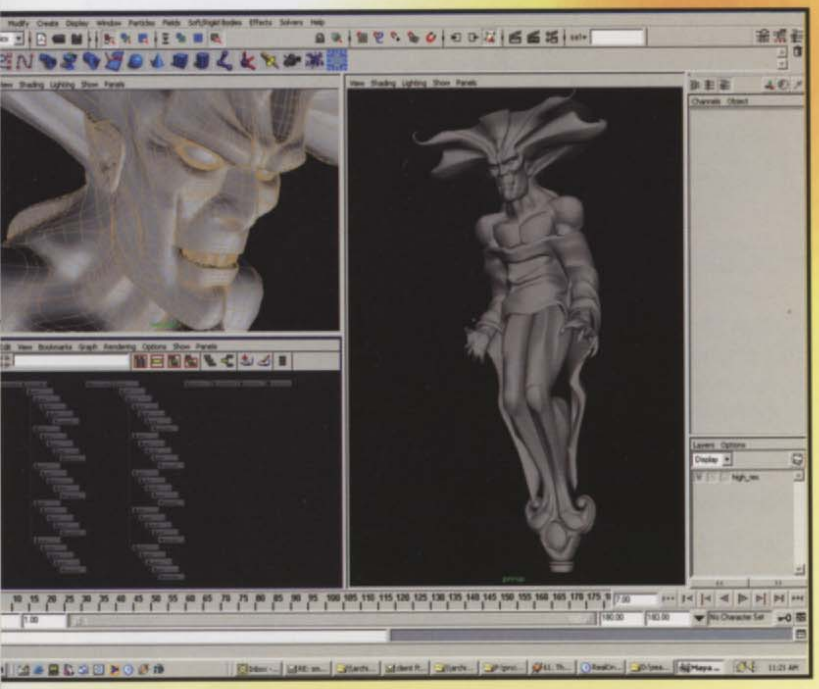
going back to get more if we made a mistake, pre-production was the linchpin of the entire process.

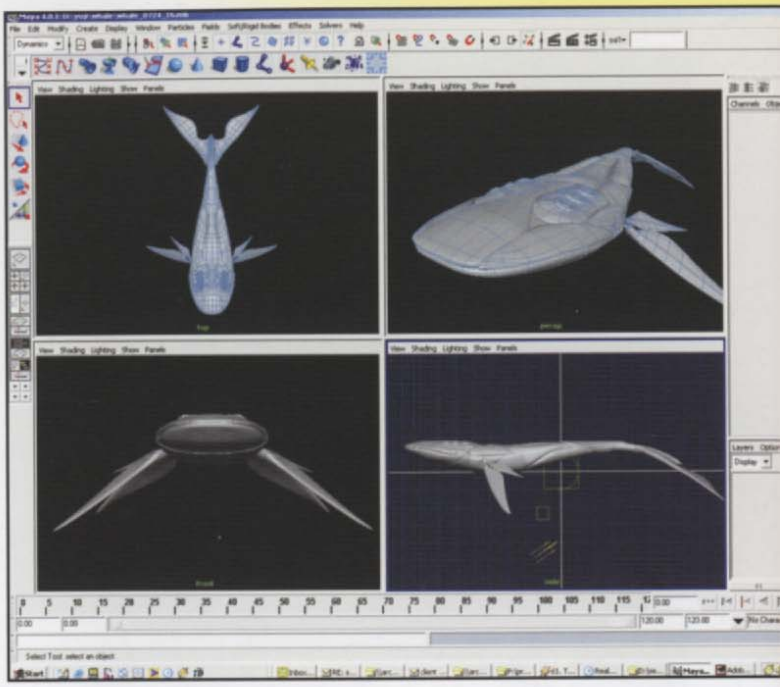
Making It Happen In The Real World

Supervising on set for 3D effects and animation is always a challenge and "In The End" was no exception, since there were three major sets scheduled to be shot over the two-day shoot. The first was a lower set where Chester emerges from a platform near the statue's belly. Another was the main stage in the statue's crown. The third was the desert environment, which was shot on a separate stage against a "green screen" sike, since it was to be completely generated in 3D. This sike consisted of three walls and the floor with all the corners smoothed out so that it could be lit without shadows.

Since so much of the video would require CG set extension, I arranged for the crew to mark the edges of each set for reference during camera tracking. Under my supervision, the crew marked along the upper and lower edges of the sets and in a grid pattern on the sike. They used 4" x 4" white cards with red "x"s on them on the set pieces and floor of the sike and black tape on the sike walls. Such careful placement would ensure that the CGI scene have the proper scale and would define 3D space in the green sike, which would otherwise appear flat on film.

The crew also created samples of textures and other features as reference for the final CGI shots. For example, in preparation for the desert floor sequences, we shot the band members' movements on a small modeled created from foam, which gave us an accurate lighting and color reference for the desert ground. Similarly, in preparation for shots involving grass, a 6" x 6" piece of the real grass was brought in for Mike to perform on.





Building It All Up

While the film crew was shooting the band, we started revving the engines of CG. The first item on the agenda was creation of CG models. Since the breakneck production schedule didn't allow for maquettes (the clay statues that ordinarily serve as models for a project of this scale), everything had to be computer-generated from scratch. Luckily, we were able to hire specialists who turned out top-notch models in record time.

Our primary reference was Patrick's sketches of the main characters, such as the statue, the whale, and gargoyles and other ornaments that would adorn the statue. Of course, we were also guided by Nathan and Joe's vision. We knew that they wanted the statue to have the characteristics of the building but appear as a giant idol created by an ancient people. The whale would retain an organic look, but would propel itself like an airship.

It was our job to give these ideas form and to fill in the details. For the statue and gargoyles, we started out with photographic art and architecture references, which gave us a starting point for the windows, arches, buttresses, and staircases. We ended up scanning diverse images, ranging from Gothic and Romanesque architecture to the Statue of Liberty, for modeling reference.

After making the major design decisions, we tapped digital sculptor and recent Gnomon grad Sean Mills to model the figures. Sean used Maya throughout the modeling process. Each figure was generated as a simple polygonal mesh. Starting with a primitive cube, detail was added by splitting and extruding poly faces.

Sean added the final level of detail using Maya's subdivision surfaces feature, which allows an original polygonal mesh to be subdivided on a per polygon basis. This gives the artist discretion to add detail only where needed. It also offers convenience, since the subdivision surfaces updates automatically in response to low poly mesh

changes. This feature was key, since Nathan and Patrick often wanted to see real-time changes as we updated the models' proportions.

Manipulation of subdivision surfaces also has other advantages not offered by competing modeling techniques such as NURBS patches. For example, we used subdivision surfaces to make increases by varying the sharpness subsurface edges. Moreover, UV texture coordinates could be passed from the low poly model to the subdivision surface granting us complete control over the placement of texture maps over an object. Thus, the texture artists could paint detailed texture maps without having to rely on a separate 3D paint program. While NURBS models are faster in some respects (since they generate their own UV coordinate system automatically), they just don't offer the same degree of interactivity.

We did use NURBS for some of the architectural elements, which incorporated a variety of modeling techniques due to their complexity. Trimmed NURBS surfaces were used for some of the windows and arches, while polygons were picked for staircases and other hard-edged objects. A team headed by Risako Taneda created these items. This group created a library of objects that could be attached to the statue in various configurations, which were then rendered out without textures and sent for Patrick's approval.

Patrick would return these images marked with his comments. This enabled us to assemble an invaluable visual record of the evolution of each object.

Yuji Yagasaki handled the modeling of the whale and the bat (which was then replicated numerous times with minor changes to create a whole colony). Because of the complex nature of these organic characters (the whale needed leathery, weatherworn plates on a flexible body and the bat's wing membranes had to stretch between bony fingers) we opted for NURBS patch models. The adaptive tessallation of NURBS surfaces suited this work perfectly.

Camera Madness

More than 80 shots of the video required CG. For each one, we had to animate a Maya camera that matched the exact movement and attributes of the cameras from the set. Camera tracking (accomplished by a team led by Ashley Wismach in just over two weeks) proved the most painstaking part of the entire project.

The tracking team relied on Maya Live and other 3-D camera tracking software, which works by placing many tracking points on a moving image. Based on a survey of these points, the software re-creates the motion of the camera in digital space.

Before using the software, however, the trackers must import the shot footage is a sequence of files, then set up the animated camera using the camera reports from the shoot. During the actual tracking, trackers constantly monitor the data, retracing the entire process if anything is off. Motion of the band members or extreme camera pans could potentially confuse tracking software. Too few points, or too many on objects that move (like band members), can prevent the software from completing the track, which

means the artist would have to do the keyframing by hand.

Our carefully detailed measurements of the set kept these problems to a minimum. Close work between the modeling and tracking teams also helped. The modeling team re-created the filmed portions of the set to scale, which gave the tracking team a reference for adjusting their tracks.

The trackers, who picked up where the modelers left off at the end of each day, focused on low resolution models of the set pieces to get each camera move the same scale and orientation as the original. Moreover, each tracker adjusted the camera data so that could be imported eventually into a master scene. Throughout the process, we spot-composited rough renderings of the tracks with simple models to check for accuracy.

At night, I would remain with the trackers to proof the shots. I knew that a high degree of accuracy would enhance the look and feel of the video in many ways. First, we could continue the camera moves shot on set, otherwise restricted by the physical limitations of the original camera. For example, a simple pan from left to right could be reworked into a jolly and pan. Or, we could use tracking data from two shots to morph them into one, allowing the camera to roam across the massive digital varmint we were creating. Of course, accurate tracks also help the texturing process, making for seamless transitions between CG sets and shot footage.

Getting the Look

A huge part of this video relied on realistic, organic textures for the objects. To make it work, we needed to make the statue and desert look as if they'd been battered by the elements for centuries.

Starting out, all we had to work with were photographs of the stone and copper textures that Patrick had painted onto the wooden set. The texture artist, Robert Dahlin, and I had to replicate these textures on our computer-generated models. In most cases, we hand-painted texture maps using the photographs as our source material. For instance, we filled in the statue's and figures on her crown with texture maps simulating stone, using Maya's layered texture node to combine several color maps. As in Photoshop, the node features transparency channels that can combine several layers into one composite image. Thus, a stone surface can reveal layers of mortar, rest, and water damage, based on manipulation of each layer's transparency channel. We used the same layering technique to create bump, specular, and reflection maps, which enhance the realism of the stone and other materials.

We used different placement techniques for different parts of the statue. For focal points such as the face and crown, we applied the texture maps directly to the object using the UVs created during modeling.

For the rest of the statue, we used camera projection, which enabled us to texture hundreds of objects from just a few maps. For this technique, we painted over a rendered reference of many objects in Photoshop rather than using each item's individual UVs. We had created the references in Maya from a perspective camera with slight lens distortion. After painting, the finished image was projected back through the perspective camera onto the original geometry. We conducted this process for the front, back and sides of the statue then blended the projections with a layered texture node.

Lighting was the next logical step. Our mission was re-

creation of the on-set lighting as well as illumination of the entire environment for the proper mood. To accentuate an object's form, we projected spotlights with barn doors along its edges. To cast specific areas and shadow, we used lights with negative intensity.

The outdoor setting of the video posed additional challenges. The lighting had to have a diffused look, often referred to as global illumination. Instead of using a time-consuming plug-in to create this effect, I set up a fake soft lighting rig in Maya. This rig consisted of a spiral shaped curve with 16 spotlights attached with a motion path node. When lit, this setup created overlapping shadow maps, which appeared as soft shadowing. I adjusted the intensity, direction, and softness using a series of expressions. Throughout the process, I used the soft lighting rig to give all the models a more natural look.

Bringing It To Life

To bring to life the creatures inhabiting the world that we created in this video, several different character setup and animation techniques were used. It was essential that my character setup offer speed and flexibility to the animators while keeping the complex detail needed for the final rendering. To achieve this, one character setup was created that used a low resolution version of the character for animation and a high resolution final model that could be turned on only for final renders.A good example of this technique is the character setup used for the vine animation. As Mike walked across the desert floor, an intricate network of vines had to burst from the ground forming elegant patterns around his head. A simple vine model was made by extruding faces from a polygonal cube. Then, the model was attached to a skeletal chain using Maya's smooth bind. As a final step, a poly smooth function was applied to the simple model giving it an organic quality by adding more detail for each face of the polygon. Leaving the history on for the poly smooth gave the animator the ability to control the amount of detail in the vine model. Animator Val Sin Lao, could then bring the model down to its un-smoothed state allowing for quick changes and previews. Cranking up the number of divisions on the poly smooth node made the vine more difficult to animate but gave the correct look for the final rendering. Being able to quickly change from one level of detail to another gave us the flexibility we needed to get the shots done on time.

Another series of shots in the video showed a swarm of hundreds of bats escaping from deep inside the belly of the statue. A NURBS patch model of a single bat had been created, but creating and animating each bat in the shot by hand would have been to time consuming and would be difficult to change once created. A particle system was used to create the motion path for all of the bats so that a motion could be created and changed for the bats as a whole rather than one bat at a time.

The particle system created a series of points in space that could each be given a dynamic motion based on forces that are created and controlled in Maya. Changes made to these forces affect each particle in the system in a dynamic way creating very realistic random motion. Displaying the particles as simple points allows the animator to try out different combinations of forces and review the animation very quickly.

Once the animation of the particle system was completed, a simplified version of the bat model was attached to each particle's motion using the particle instancer. The instancer also allowed me to write some simple expressions that randomized the timing, scale and rotation of each bat. Using this setup, I was able to change everything from the amount of bats to speed at which they flapped their wings for all of the bats at once instead of making the changes for each bat individually.

In The End

After the shots were finished in CG, lead compositor, Patti Gannon worked integrating them with the live action footage. Communication between compositing and 3D was essential for making each shot come together. As many as fifteen layers were created per shot in order to control all aspects of the image, from the density of the shadows in the scene, to amount of reflection on the statues during the rain sequences. CG elements had to be color corrected and grain had to be added to match the film stock that the video was shot on.

From the very first meeting with Nathan, I knew that this would be one of the most challenging projects I've ever worked on. The capabilities of Maya, and my knowledge of them were stretched to the limit. I tried to use Maya's technology to enable the artists to express themselves. My main goal was to create processes and set up shots in a way that made it easier for the artists to do what they did best and minimize time spent waiting for files to update or repeating time consuming tasks.

A lot of hours were spent on this project and everyone who worked on it was committed to making it the best it could be. Many artists contributed their unique talents to this job; and as their supervisor and lead animator, it was very satisfying to see it all come together in the end.

Raydiosity

Global Illumination and Final Gathering using SOFTIMAGE|XSI

by Ed Harriss

In the real world, light is emitted from a light source. It strikes an object and is reflected or bounced back. This light can land on other objects in the scene, creating what is known as bounced light. Normal computer-generated lights cannot bounce light. If you attempt to light a CG environment the way you would a real world environment, they would not look the same at all. In fact it would look very flat as in Figure 1. Since CG lights do not bounce, you must resort to simulating it with lights that fake bounced light. This may be a really good way to do it, but it is very time consuming. In SOFTIMAGE|XSI, there is a function called Global Illumination, also referred to as Radiosity. Global Illumination (GI) is the simulation of bounced light; and if used properly, it can achieve stunning results as in Figure 2.

GI works by shooting small pellets of light into the scene. These "pellets of light" are called photons. Photons bounce around the scene, illuminating each object they touch. Once the number of bounces reaches a user defined limit, they will stop. As they do this, they will pick up some of the color from the objects that they come in contact with and spread it around the scene.

Final Gathering (FG) is another way mental ray (the renderer for SOFTIMAGE|XSI) can calculate "radiosity" but without using photons. It calculates both direct and indirect lighting, using rays cast from the object's pixels rather than from a light. Using this method, objects with constant (or self-illuminating) materials can be used as "lights". As a result you can create lights that are any shape or size. See Figure 3 for an example.

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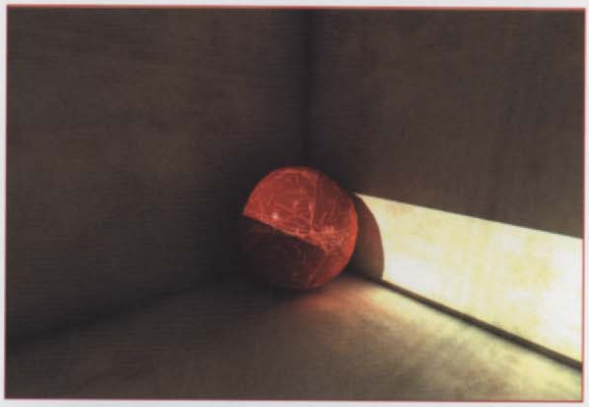
Figure 1

Figure 2



These two techniques tend to complement each other very well. It is not uncommon to use both FG and GI to light a scene. However, they both work rather well on their own.

Download the file called "xsiproject.zip" from http://www.highendmag.com/issue1/ xsiproject.zip and unzip it.

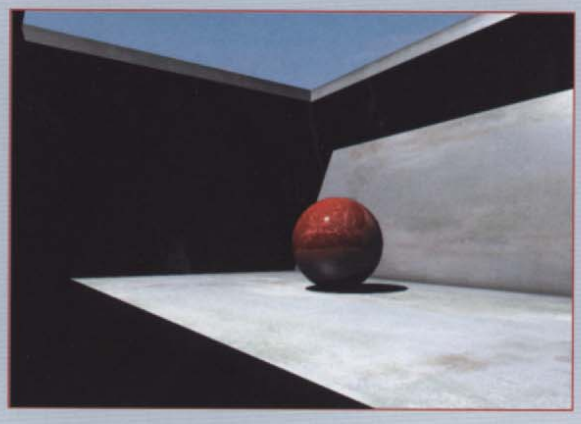
If you are using SOFTIMAGE|XSI 2.0 or higher, load the scene called GI_FG_2.0.scn.

If you are using SOFTIMAGE|XSI 1.5, load the scene called GI_FG_1.5.scn.

Figure 3

To make sure you are looking through the camera, choose Cameras>Camera from the drop down at the top of view port B. Draw a render region in view port B by pressing the Q key on your keyboard and dragging from left to right. Looks like a typical CG render, doesn't it? See Figure 4 for an example. This is supposed to be a room with a large skylight in it, but at the moment it looks a lot like a dark basement. Once the GI and FG Effects have been applied, it will look completely different.

Figure 4



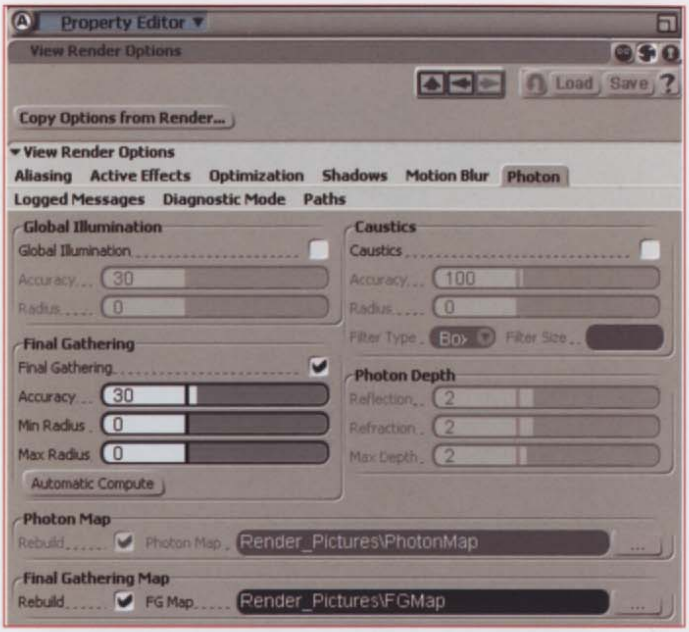
Final Gathering

For FG to work you'll need to do two things.
1. Create something to generate light.
2. Turn on FG.

In this scene there are already two light sources. The most obvious is the spotlight called "spot". The other not so obvious "light" is the hemisphere that has been placed around the scene (sky). It has a constant material assigned to it as well as a sky texture map. See Figure 5 for an example. This combination will cause it to act as a giant hemispherical light, just like the sky in real life does. It will throw different colored light into the scene based on the colors of the pixels in the sky texture map. For example: Areas of the hemisphere that are covered by clouds will throw light grayish/white light into the scene. Areas that

Figure 5

Figure 6



are covered by clear sky will throw a light bluish color into the scene. After you've finished this tutorial try replacing the sky texture map with something else. You'll be surprised how different the scene will look just by using a different texture map.

You'll be making a lot of adjustments to your scene, sometimes two or three at a time. Since FG and GI are so processor-intensive, leaving the render region "auto refresh" turned on can slow things down considerably. I suggest that you turn it off by un-checking Render>Region>Auto Refresh. Whenever you've finished making any changes, hit the Render>Refresh button to update the render region.

To see the effect FG will have on your scene, open up the render region property page by clicking Render>Region>Options. Click the Photon Tab, and check the box next to Final Gathering, and press the Refresh button. See **Figure 6** for an example.

Take a look at your render region. The lighting is better, but now the image is "splotchy" and takes a bit longer to render. Why is this happening? The reason is the default FG settings are too low for accurate output. Fortunately, this is very easy to fix. The settings that are going to be used to fix the "splotchiness" of the scene are found in the FG section and are called: Accuracy, Min Radius and Max Radius.

Accuracy

Final Gathering takes samples that are associated with a "light emitting or bouncing object" and fires a ray from it. The Accuracy setting controls how many rays are computed from each of those samples. The higher you set the Accuracy the more rays are computed. The more rays you compute, the nicer your scene will look (to a point), but the slower it will render. The default is 30. I suggest trying a setting of 100 if you are using SOFTIMAGE|XSI 2.0 and a setting of 175 if you are using SOFTIMAGE|XSI 1.5.

Min and Max Radius

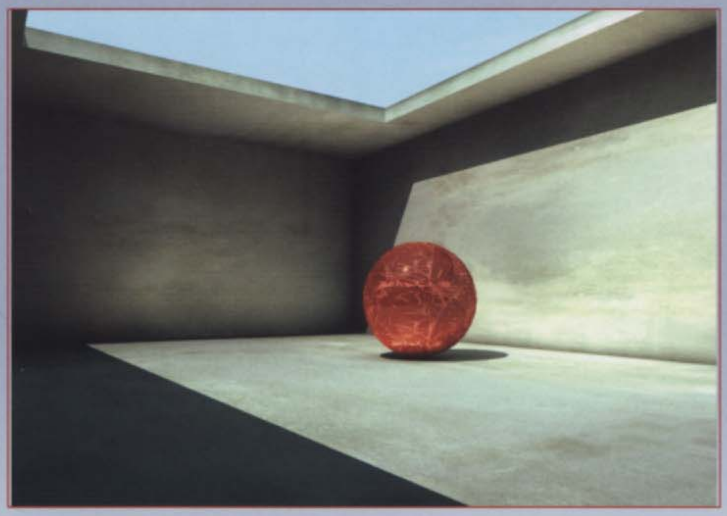
The Min and Max Radius settings define the size of the hemispherical sample area that mental ray uses. Think of it like this: Using high numbers for radius samples provide mental ray less to sample, since the sample area is so big. Less sampling means faster rendering but more inaccurate results. Low numbers for radius samples give mental ray more to do. It takes a lot more time to render when the samples are small. The disadvantage is that your render will be slower. The advantages are that it will look better and will create more accurate results, especially in small spots, tight corners, and on intricate models.

You might think that settings of zero would be best (since you can't get any smaller than zero, right?), but they are not. Leaving the min/max settings at zero tells mental ray to "guess" at a value for you. Sometimes it looks ok; sometimes it does not. You are usually better off using your own settings.

If you are using SOFTIMAGE|XSI 2.0, then you'll probably never have to figure out what Min/Max settings to use, since there is an "Automatic Compute" button that will figure it out for you. This button will automatically calculate the Min and Max settings using the bounding box of your scene. It does a pretty good job too. Press this button and your min radius should set itself to around 5, and your max radius should be about 50.

Final Gathering in SOFTIMAGE|XSI 1.5 works a little differently. This is because it uses an earlier version of mental ray that uses an older method to calculate the FG. Also, there is no "Automatic Compute" button in 1.5 (you'll have to adjust the settings manually). I'd suggest setting your min radius to 0.05 and your max radius to 0.1. Unfortunately, this will render a lot slower than it would if you were using SOFTIMAGE|XSI 2.0 but at least the results will look similar. Since there are dramatic differences between mental ray 2.1 and 3.0, FG/GI rendering is approximately 15 times faster in SOFTIMAGE|XSI 2.0 than it is in 1.5.

Figure 7



Once you've finished making these changes, hit the Render>Refresh button to update the render region. It should look something like **Figure 7**. <insert FG_done.tif with caption "Figure 7">

FG Maps.

One of the most time consuming parts of FG rendering is creating an FG map. This is a file that mental ray creates which holds all of the FG information for that particular scene. (Please note, this function is not available in SOFTIMAGE|XSI 1.5.) Once you are satisfied with the FG lighting in your scene, you can speed up rendering tremendously by telling mental ray to use the last FG map that it created. This step is not necessary; but if you want to do it, here is how. Select a folder and designate a file name for your FG map by using the browse button or typing it in at the bottom of the Photon Options page. Render your scene one time to generate the FG map. Then, uncheck the "Rebuild FG Map" box. Once you've done this, your future FG renders will start up almost instantly.

Global Illumination

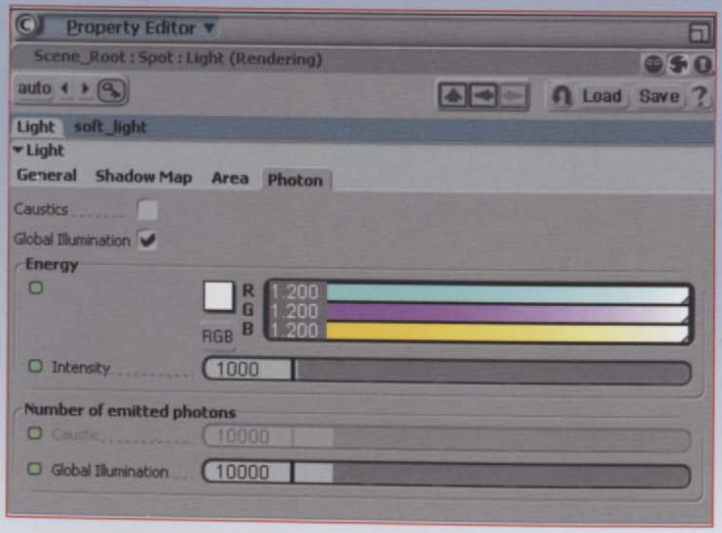
That's all you have to do to get FG to work in your scene. (Pretty easy, isn't it?) Now it's time to throw some GI in with the FG to make your scene look even better. For GI to work, you'll need to do three things.

1. Create photons.
2. Tell mental ray what objects should participate in the GI rendering.
3. Activate the GI option in mental ray

Creating Photons

Photons are created by the lights in your scene but not by default. You'll need to activate photon generation in the light's shader. Select the light in your scene (it's called Spot). Be sure that you select the light emitter, not the target or the parent. Open its property page by choosing: Modify>Shader. See **Figure 8** for an example. Click the photon tab and check the box next to Global Illumination. The Energy Color, Intensity, and Global Illumination sliders will highlight. These settings control the power and the number of photons. The higher you set the Intensity and Color sliders, the brighter your GI effect will be but does not affect render time. The higher you set your number of emitted photons, the better your GI rendering will look, but the slower it will render. Turn the Intensity up to 10,000. This will make the photon's effect bright enough to see. Leave the Global Illumination set to the default of 10,000. This might not seem like a lot of photons; but when you are using GI in combination with FG, you are able to get away with fewer photons. Fewer photons means faster rendering.

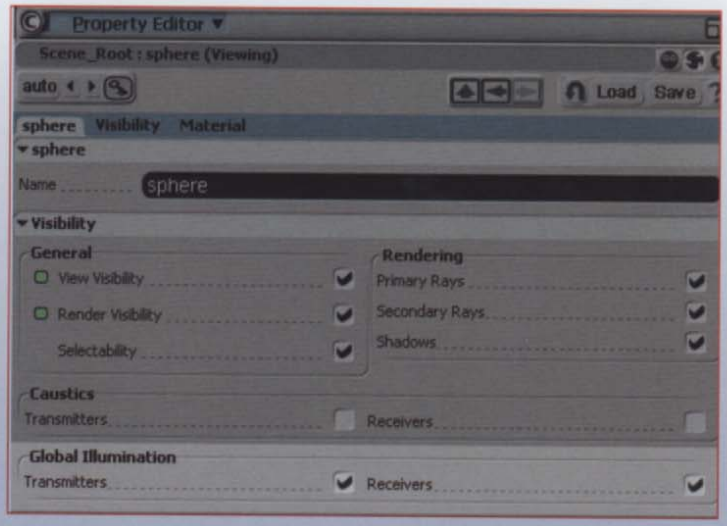
Figure 8



Transmitters and Receivers

Now you've must define which objects will interact with your photon emitting light. Select the small Sphere with the Left Mouse Button, then Right-click on the selection button and choose Viewing Properties from the menu. The Viewing Properties page will open up. See **Figure 9** for an example. Click the Visibility Tab. At the bottom of this tab, there is a section called Global Illumination; and in that section, there are two check boxes (Transmitters and Receivers). Checking the Transmitter box will cause the object to reflect light. Checking the Receiver box will cause it to receive reflected light. In this particular scene, we want all the objects to Transmit and Receive light. So, we'll need to check both boxes for all the objects. Once you've checked the Transmit and Receive boxes for the sphere, repeat the process on the room and the sky hemisphere.

Figure 9



This can be done much faster by selecting all the objects at the same time. Then, open up the Viewing Properties property page and check Transmitters and Receivers. This will activate the Transmit and Receive properties for all the objects that are selected.

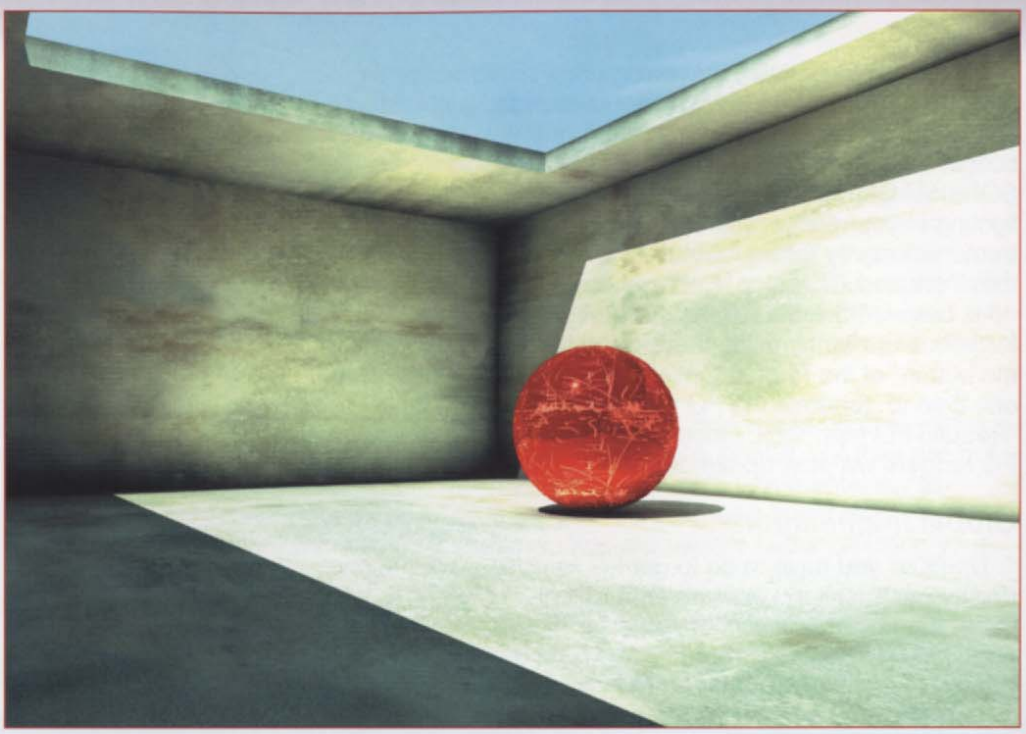
Activating and Adjusting GI

You have set up the light and the objects in the scene. Now, you need to tell mental ray to activate global illumination. Choose Render>Region>Options. Click the Photon tab, and check the global illumination box. Like FG, GI has a radius setting too. The Radius setting controls the size of the photons, which are measured in SOFTIMAGE units. If it is set to zero, mental ray will estimate a number for you. Any other setting will change its size accordingly.

In this scene, small photons are not going to work because we need them to overlap to get decent results. With a large setting they will blend together better and give us very smooth

results. The larger your scene is, (in SOFTIMAGE units, not polygons), the higher you'll need to set the radius. In this scene, a radius setting of 5 will work great for both SOFTIMAGE|XSI versions 1.5 and 2.0.

GI also has an accuracy setting. Set this value too low and the effect will be grainy. Set this value too high and your render will take forever. In this scene, a setting of 100 will work just fine for both SOFTIMAGE|XSI versions 1.5 and 2.0. Press the Refresh button to see your results. Now it looks much better, the light is much more pronounced; and it looks a lot more like natural light. See **Figure 10** for an example.

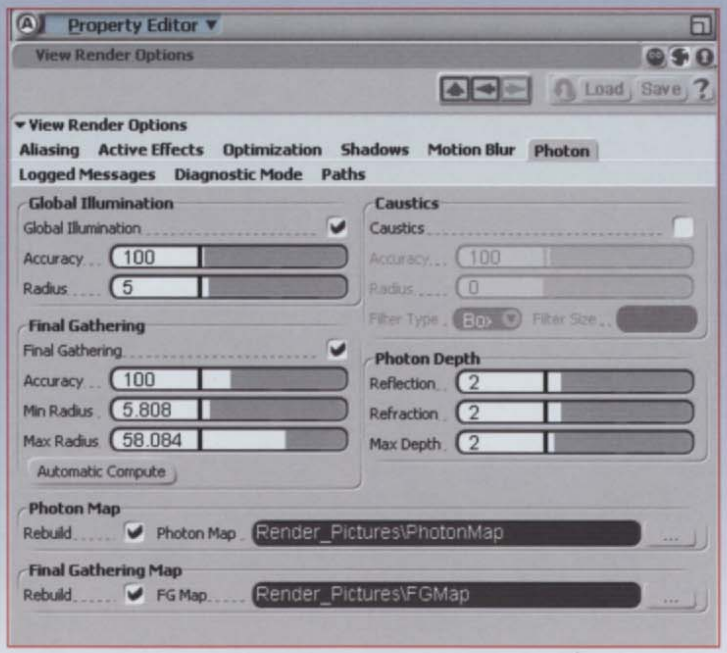


More GI Options

GI has the ability to store its map just like FG does. This type of map is called a Photon Map. Once you are satisfied with the GI in your scene, you can save your GI map and uncheck the Rebuild Photon Map. Just like FG maps, it will make your render launch faster, but GI has an option that FG does not have, Photon depth. This option has three settings, Reflection, Refraction and Max Depth. The reflection settings control how many times a photon can bounce before it loses all its energy and has to stop.

The refraction setting deals with caustics and is not really related to what we are doing with FG/GI. So, we will not address that in this tutorial. The max depth is a setting that limits the total reflections and refractions. The default is 2. This means that a photon can reflect once and refract once or reflect twice but not refract at all or refract twice and not reflect at all.

Figure 10



Try this experiment. Turn up the Reflection and Max depth settings to 6. You'll notice that your rendered image will become much brighter. The reason for this is the Photons will bounce around more and more the higher you turn this setting up. As a result they are spreading more photon energy around the scene and leaving some of that energy behind on everything they touch.

Conclusion.

As you can see, GI and FG are a couple of the most powerful tools available to anyone that wants to do photo realistic CG lighting but does not have the time to set up the necessary lighting rigs to achieve these types of effects in a traditional manner. With the introduction of mental ray 3.0 in SOFTIMAGE|XSI 2.0, the render times for this type of effect have become low enough for the average production to make use of them. Even if the render times prevent it from being used as the primary lighting tool in your next production, it makes a great tool for lighting pre-visualization. You can light your scene with it, render out a frame and use that image as reference to light the scene traditionally. Also, there is a function in SOFTIMAGE|XSI 2.0 called rendermap. It will allow you to "bake" the FG and GI information onto your objects so that you don't have to use FG and GI when you render the scene, but it will look like you did. Whatever method you currently use to light your scene, I guarantee that once you've used FG and GI you'll never want to go back to traditional CG lighting again.

Ed Harriss is a 3D artist that creates training material for SOFTIMAGE|XSI and mental ray. For more information and instructional material visit www.EdHarriss.com

Tutorials

3D Camera Setup

by Mark Lefitz

When reviewing demo reels, one element of 3D animation that usually stands out as novice is the movement of the camera through space. Usually, when viewing someone's work who is fairly new to 3D, the camera's movement tends to be overworked with many twists and turns that lack any resemblance to real world cameras. Here are some basic guidelines that should help.

Perspective

In film, when two shots are placed side by side, the interaction between the images produces what is called Sequential Perspective. The aim is to create sequential continuity between shots. If your first establishing shot, or Long Shot, has a high angle of view (taken from above at a distance), the Medium shot and the Close Up should have the same image size and angle of incidence. Avoid having the middle of the sequence at eye level.

Framing

There are two types of framing. The first, Open Framing, is the type usually found in documentaries. They are usually the kind when subjects are cut off by the edge of the camera or obscured by foreground elements. Closed Framing is when objects are carefully placed within the framework of the lens. Try and use just one throughout your animation.

Camera Roll

Changing the camera's orientation so that it is no longer parallel to the ground plane can give the shot a feeling of skewed reality. A little bit of roll can give the shot a huge change in feeling. Keep it subtle.

Convergence

To prevent your image from looking like the edges are leaning into or out from the frame, you can remove the third vanishing point. To do this, adjust your camera's Y offset just a bit in either the positive or negative direction and then locally rotate the camera in the opposite direction of the adjustment.

Multiple Cameras

One trick you might want to employ is crate two or more cameras in a single scene. One camera can be your primary camera to render the majority of your scene. Your secondary cameras can then render close ups from different angles. Using any number of editing packages like Adobe Premiere, you can then have an interplay between shots.

Center of Interest

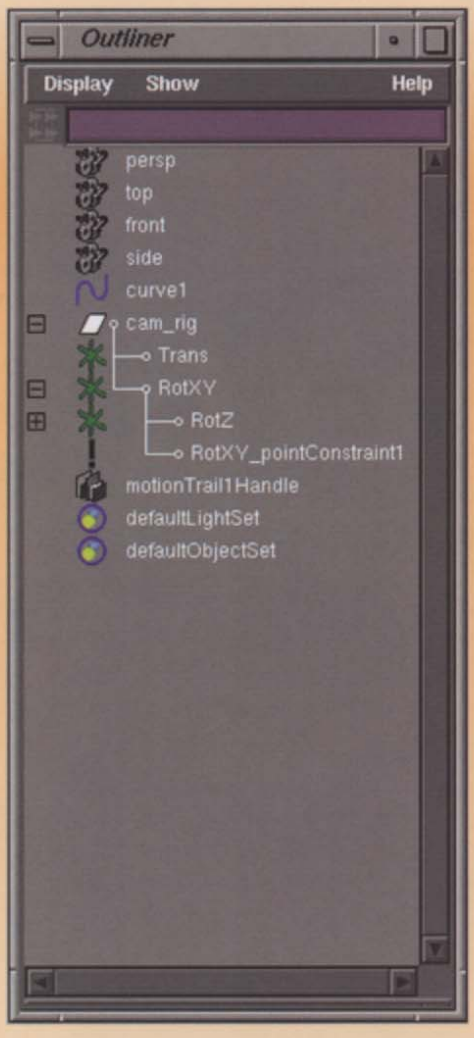
There should always be a focal point that your eyes go to when viewing an image. That focal point, or Center of Interest, should not be place in the middle of your frame. Try and follow the One Third Rule, that is, place the center of interest in either one-third portion of the rendered image. This includes the horizon line. Try and locate this line in the top or bottom third of the frame

Simplicity

Probably the most important rule is to keep it simple. A good test for your animation is whether anything can be removed from your scene without changing your intent.

Camera Paths

If you plan highly dynamic camera moves over a large amount of frames, use Camera Path Animation. Path animation allows a camera to be animated along a NURBS curve. You do not need to create a multi-grouped camera when animating along a path. Also, transformations on the camera occur at the pivot point. Here is a typical workflow:



• Lay out a Degree3 NURBS curve along a path in which you would like to see the camera move

• Create a single-node camera

• Select the camera, then shift-click on the curve. In the Animation menu set, go to Animate>Paths> Attach to Path

• You can set a time range or use the range that is set on your Time Slider

• Select CV's and move to adjust your path

• In Object mode, select Locators in the Masking tools

• Select the end locator at the end of the path

• Middle mouse button slide the locator to adjust the timing of your animation. Make sure you are in the Move mode

• Scrub the camera along the path by either selecting the camera, pressing "t" and middle mouse button move the camera; or

• Select "MotionPath1" in the Channel Box and use the virtual slider with the U Value

• Open "Motion Path1" in the Channel Box to set key frames for Twist values. Do not use the manipulator

• Bake out your animation by selecting the camera and going to Edit>Keys>Bake Simulation

• Open the Graph Editor to add "ease-in" and "ease-out" to your curves for a more polished look

Constraints with Path Animation

Another way to set up your camera is using a set of locators. This is particularly helpful when animating over long distances with many twists and turns, such as a long tunnel.

• I created my tunnel by laying out a degree 3 NURBS curve and extruding a circle along it's path.

• I then select the isoparms running along the width of the tube and duplicate them.

• Duplicate these isoparms into curves and loft between them. Keep Construction History on.

• Select all the curves and Center Pivot.

• Now I can move, rotate, and scale the duplicated curves to adjust my tube.

• Create a one-node camera and three locators, all at the Origin.

• Name the first locator Trans, the second locator RotXY, and the third locator RotZ.

• Parent the camera under RotZ, and parent Rot Z under RotXY. Do not parent Trans. By separating the rotation nodes, this prevents Gimble Lock, when two or more rotation axis cross each other and cancel out their effect. This configuration also makes it easier to manipulate your animation.

• Lock unwanted rotation, and translation channels in your Channel Box for each node selected.

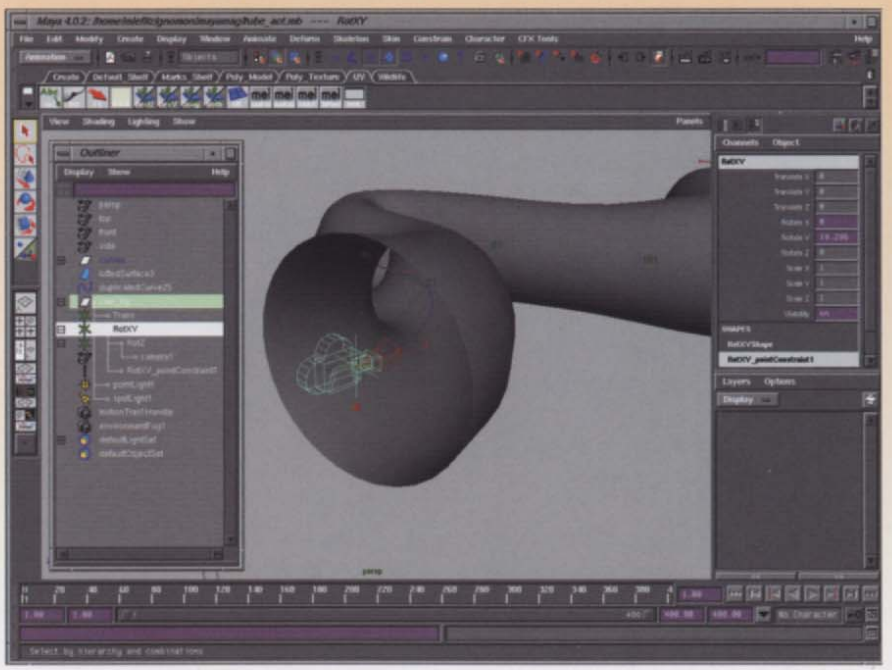
• Now group the Trans node with the RotXY node. Call this group "cam_rig".

• Select the Trans node then the RotXY node and go to Contrain>Point. Selection order is very important here.

• By contraining these two nodes, the Trans node cannot pass rotation values to the RotXY node.

• Once this camera rig is set, we can select the cam_rig node, then the original curve used for the extrusion, and Animate>Motion Paths>Attach to Motion Path. Make sure the Follow option is off. I turn Follow off so that the camera does not roll or bank along the curve, giving me the freedom to add anticipation and the rotations myself.

• If you do not have your original curve, simply run the



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"My thanks to Darrin for the great 'Jewels and Gemstones' tutorial. The whole texturing course was awesome! I ran into some problems with shading networks in Maya (I previously used 3dsMAX), but now it's so much easier....I especially liked the displacement explanations."

Antonio Lelas

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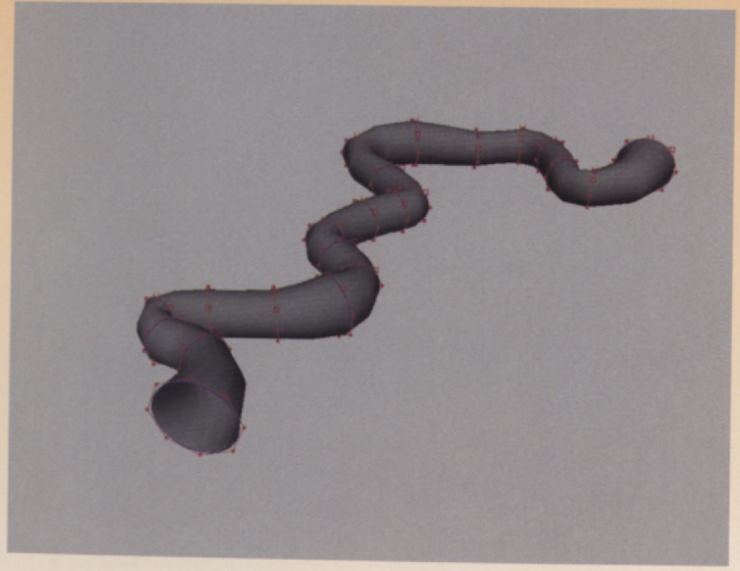


inBetween.mel script found on highend3d.com. To run this script, you must select two isoparms that run the length of the tube on opposite sides of each other and duplicate them.

• To further help fine tune my animation, I select the cam_rig node then Animate>Create Motion Trail. Make sure Show Frame Numbers is selected. For a 400 frame animation, I set the Increment to 20. The motion path helps me to manipulate the key frames at certain points along the path.

In a later version, I've parented a spot and point light to the rig, as well as Environmental Fog. I will later add color, specular, and displacement maps to the geometry, as well as additional model detail, such as rocks and debris.

Additional Tips:

• Do not use Dolly, Tumble, or Track through the perspective view

• When setting key frames for any of these channels, remember to have the correct node selected

• Animate by using either the Move or Rotate manipulator on the appropriate nodes

• Lock channels for Focal Length, Camera Aperture, Lens Squeeze Ratio, F Stop, Focus Distance, Shutter Angle, and Center of Interest once you establish these attributes.

Suggested Readings:

Mascelli, Joseph V. The Five C's of Cinematography: Motion Picture Filming Techniques

Fielding, Raymond. The Technique of Special Effects Cinematography (4th Ed.). London: Focal Press, 1985.

Perisic, Zoran. Visual Effects Cinematography. Boston: Focal Press, 2000.

Barclay, Steven. The Motion Picture Image: From Film to digital. Boston: Focal Press,2000.

Help for this tutorial came from John Nguyen.

Lighting & Rendering in Maya

by Alex Alvarez

In this multi-part series, we will look at how to control Maya's image output. Much of what is said, however, applies to most renderers. In part one, we will discuss the fundamental concepts behind successful lighting, with less of a focus on specific Maya techniques. One must train their eye in a way, which has little to do with the software. When critiquing an image, anyone can tell if the image does not look 'natural'. What one must learn, however, is to know exactly why. One must be able to identify a problem before it can be removed.

It has been said one too many times that Maya's renderer is "bad". While it is far from perfect, production quality results are achieved on a daily basis by hundreds of studios. The 'problem' is that Maya's renderer requires a good deal of proficiency before an individual can wrangle good results out of it. The default render settings, globals/stats, are set for performance not accuracy. These issues are then coupled with the user's need for an understanding of 3D rendering technology vs. the traditional lighting techniques of the photographer/ cinematographer. Light does not

behave the same way in Maya as it does in the real world. It does not bounce. This is true of many renderers. While new technologies have emerged to deal with this issue, such as raytracing and global illumination (GI). They tend to be ignored by high-end production due to their poor performance in heavy scenes. So, while it would be nice for the 'feature list' of Maya to have GI, how many people would use it? The ability to get a scanline renderer to produce photo-real results with acceptable render times by faking GI is far more appreciated in production than one's ability to enable GI in a renderer such as Lightwave, mental ray or Brazil.

Aside from the problem of reflected light, there is also the question of how to naturally light a subject. Remember that most live-action television shows are shot on a soundstage. Cinematographers understand how to play with light to replicate the lighting conditions, which occur in virtually any natural situation so that the audience believes that the images were shot 'on location' with 'available light'. This skill is crucial to the 3D lighter as all renderers are 'stupid' in respect to what is 'natural'.

So what to do?

Lights in Maya have several attributes, which define their behavior: color, intensity, decay, shadows, fog, glow and so on. Shaders in Maya have several attributes, which determine how they interact with light, which should be broken down into two main categories: diffuse and specular illumination.

When lighting a scene, one must always balance lights and shaders. The 'perfect' blinn shader for steel doesn't exist. Specularity is a reflection of the lightsources, and light quality ranges from hard to soft. This observation is a key importance. Again, this issue is a big deal. When adding a light to a scene, the first thing you should ask yourself is, "Is this light hard or soft?" Maya's shaders (Blinn, Phong, Lambert, etc) are 'hacks', ways to simulate raytraced reflections of lightsources via a scanline renderer. This observation should make you realize that any material can be represented by a Blinn shader, which is why Blinn is the only shader I ever use (Phong renders faster than Blinn, but I have found the difference to be negligible, and Blinn has greater flexibility).

If you are new to the art of lighting, then perhaps you haven't thought about the 'hard vs. soft' issue. So, let me explain it. It is very simple. Hard vs. Soft is an issue of light size. A small light is harder than a large light. The sun is a hard lightsource. The sky is a soft lightsource. A halogen light in a room is harder than the light bouncing off of the floor, since the floor is larger than the light bulb.

Hard light is defined by hard-edged shadows and focused specularity. Soft light is defined by soft shadows and sometimes the absence of specularity. On a clear sunny day, a tree casts a shadow, which is hard-edged but harder near the base of the tree and softer as the distance increases (this will be explained later). On a very overcast day where the sky is evenly bright, you will not see hard shadows, although there will be a soft darkening in areas which are receiving less illumination from the sky. Would you see a tight specular highlight on a steel sphere on a cloudy day? No. The reason is the highlight that you usually think of is a reflection of the sun, so no sun, no highlight.

So, why does a shadow have varying fuzziness along its edge based on distance of the edge from the shadow-casting object? Again, this is based on light size. The majority of lightsources you will ever attempt to replicate will not have complete hardness (infinitely small size). While the sun in the sky is small, it is not a finite point. Furthermore, the sun creates a blooming haze around it due to the atmosphere, which increases its relative size. When learning how to plot shadows in a perspective class, lines are usually traced from the lightsource as if it is a finite point. The result is hard shadows; but if lines are traced to each edge of a large lightsource area, it will be evident that the lines land on a shadow-receiving object in different locations. The distance between the landed points determines the fuzziness of the shadow edge at that location. These relationships are best

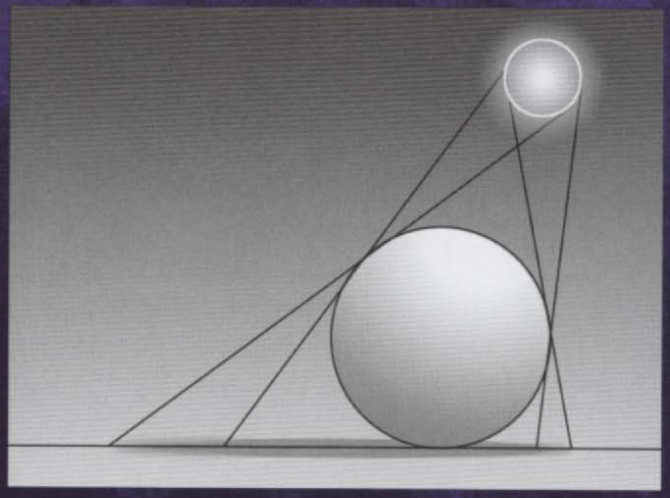
illustrated via a diagram, such as figure 1.

With this in mind, it should be evident that the look of shadows should not be seen as guesswork (or what 'looks right') but a measurement of the light size you are trying to represent.

Light quality

The quality of any lightsource in nature is defined by its size, color and intensity. The default values in Maya for these attributes yield lights, which are not natural for most situations.

Figure 1: Image of light size vs cast shadows.

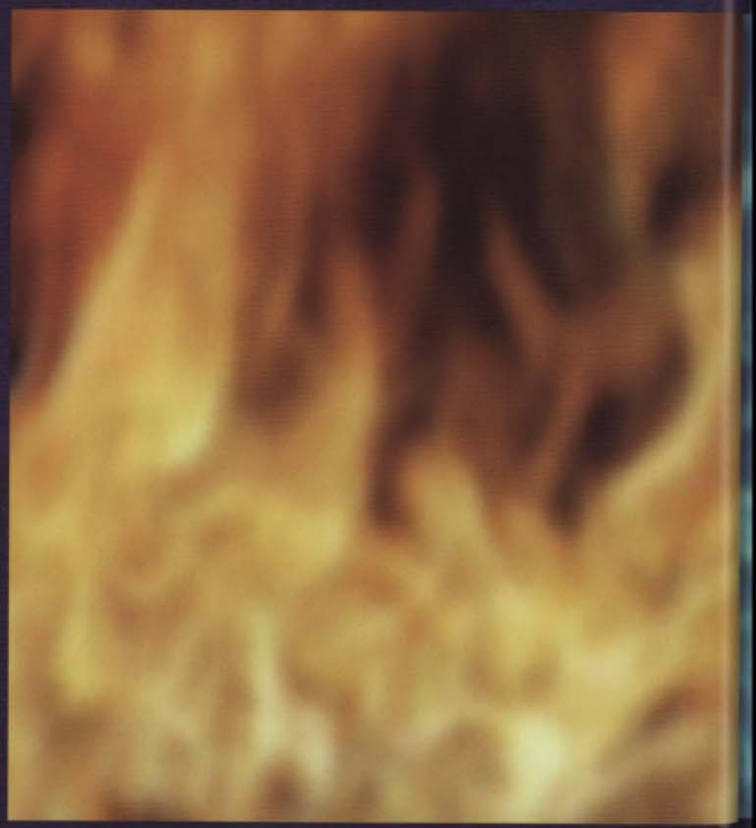


Color

While it is simpler to change a light's color in Maya than it is on a soundstage, be aware that the way we perceive light, via our eyes or exposed film, is not so simple. While light does have measurable temperature, eyes and film have what is known as color balance. My right eye, for example, sees colors as warmer than my left. Furthermore, eyes compensate for light conditions so that a piece of white paper will always appear white. Film stocks also have a color balance, which often surprises neophyte photographers (i.e. why do my photographs look green?). I mention these issues because if you want your Maya renders to look as though they were shot by a real camera, you need to understand why electric lights appear more saturated in an evening photograph than they appeared to your eyes. The only way to learn this is to look at photographs. Do not look at other people's 3D renders when trying to learn how to light or else your work will become an interpretation of an interpretation. Therefore, determining light color is a matter of knowing the appropriate light temperature vs. the film stock you are trying to mimic.

Lights in nature also do not always have uniform color, as they do by default in Maya. Remember that light color can be textured via 2D or 3D textures to achieve more natural results. The light that comes from a fireplace is warm, but the light is coming from a large area (soft) and the color varies across that area. Maya solution: texture the light's color with an animated (and blurred) image sequence of real fire (figure 2a). If you sample reality in your work, you have a better chance of achieving natural looking images. Another example would be the caustic lighting effects found underwater. While the Maya Caustics plug-in is useful for many situations, why slow down your render if you can find real caustic footage that works for your scene (figure 2b)?

Figure 2a: Blurred photo of real fire



Intensity

Light intensity is also a naturally measurable phenomenon; but in Maya, the issue rests with one's understanding of natural perception. The same light does not always appear to have the same brightness to our eyes or to a camera. This is a by-product of pupil size or exposure. When moving from the bright outdoors to a dark interior, we all know that our eyes automatically adjust. This adjustment is due to the fact that we can only perceive a finite range of light brightness. Cameras have a similar quality, which is determined by f-stop, shutter speed and film speed. As previously mentioned, it is only by studying photographs that one can become tuned to the natural balance of light vs. dark (chiaroscuro). While research continues into CG techniques for replicating natural exposure based on the naturally infinite nature of light intensity (such as the HDR work accomplished by Paul Debevec), these issues still remain the responsibility of the 3D lighter and compositor.

In regards to Maya, there are a few intensity tips, which can help improve your renders. By default, all lights have their decay set to none. One should always change this setting unless you are creating a lightsource, which is very far away, such as the sun or moon. In nature, all light brightness decays with distance. The 'inverse-square' law governs this behavior, where light intensity is based on the inverse-square of distance. The 'quadratic' setting replicates this behavior; but for practical purposes, one will find that 'linear' works best. Every time I create a light, the first thing I do is set decay to 'linear' (unless it is the sun, etc). It is less naturally accurate, but it helps in most situations to have the reduced decay in order to simulate the reflection of light from environmental objects.

Figure 2b: Photo of water caustics

There are several light types in Maya, each with their own unique benefits, but you should try to use spotlights for the majority of lighting tasks. They render faster (a point light takes six times longer to render depth-map shadows than a spotlight). Since this is the case, one should be well aware of how light intensity behaves with a spotlight.

Maya spotlights have two attributes, which control the intensity of the light within the cone: penumbra and dropoff. While it is simple to understand what these attributes do, it is more important to understand what they represent in terms of real-world lighting. Their default values of '0' mean that they are disabled. This is virtually always unnatural. The result is an even light intensity from the center to the edge of the light cone with a hard cutoff at the edge. Penumbra controls the edge falloff, while dropoff controls the falloff from the center to the edge.

Spotlight edge quality (penumbra) is a result of two factors in nature: focusing or shadow. Real-world lights are always point lights (light bulbs) within a housing. The housing creates a shadow as the light only escapes from one side of the housing. Therefore, the area where light is not escaping is actually a shadow, and the area where the light begins is a shadow-edge. For this type of spotlight, penumbra is therefore used to control the fuzziness of the shadow cast by the light housing. With this in mind, the further the light is from the receiving objects,

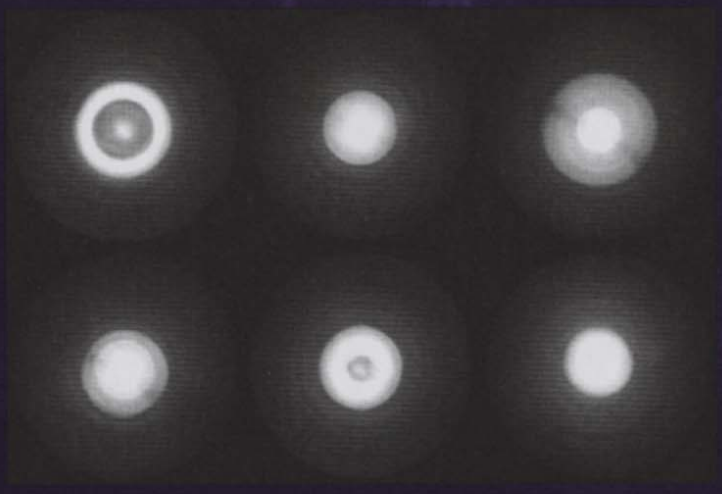
the greater the penumbra value should be. Often, however, real-world spotlights have a reflector within the housing. This is true of car headlights and certain flashlights. These reflectors are used make spotlights more energy efficient. With a focusing reflector, the edge of the light cone may no longer be a shadow, but simply the edge of a focused beam.

Spotlight 'dropoff' in Maya allows for control over the intensity from the center to the edge of the light cone. While some spotlights in nature will have even intensity, lights with a reflector, or light, which is bouncing off of a surface, will not.

To illustrate these concepts, it should be apparent that one should try to experiment with as many real light sources as possible to achieve a broad understanding. What you will learn, however, is that not all light sources are as simple as what penumbra and dropoff allow. See figure 3.

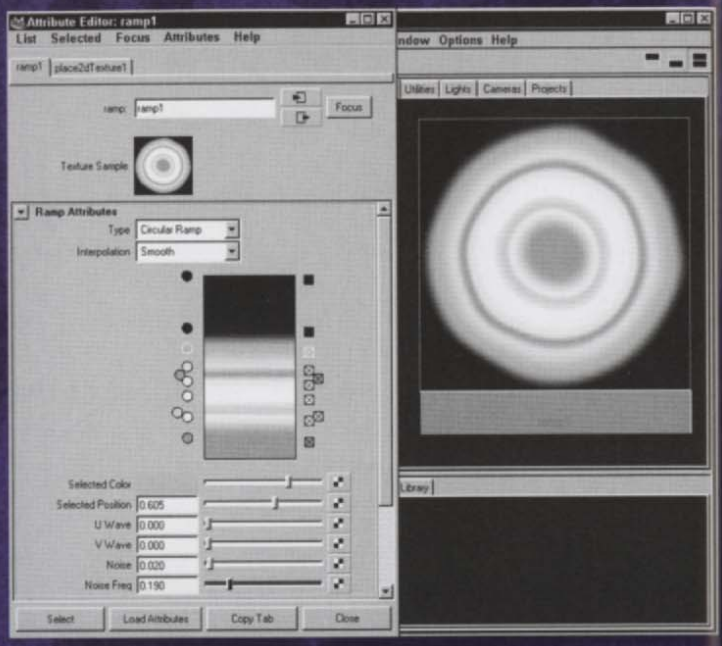
If a more complex light intensity distribution is needed than what is possible via penumbra and dropoff, there are two solutions: circular ramps or file textures. With penumbra and dropoff left at the default values, disabled, light color can be textured to achieve more flexible results.

Figure 3: Photographs of light patterns cast by a flashlight.



A circular ramp mapped to light color can be used to yield a variety of light intensity distribution patterns. For more natural results, be sure to set the interpolation type to 'smooth'.

Figure 4: Image of circular ramp with a little noise



A 2D file texture can also be used when it is necessary to achieve results, which would be cumbersome via procedural methods. By using any of the images from Figure 3, very realistic results are possible, since we are simply sampling reality and all of its imperfect nuance.

Hard vs. Soft

The way that one controls color and intensity have nothing to do with whether the light is hard or soft. As previously mentioned, however, this issue is a crucial component to successful rendering. In order to balance the effect of light size on scene illumination, one must rely on shader specularity settings and shadow appearance.

In another issue of Highend Magazine, we will explore how to create scenes, which exhibit hard or soft lighting, as well as the common situation where both light types are present.

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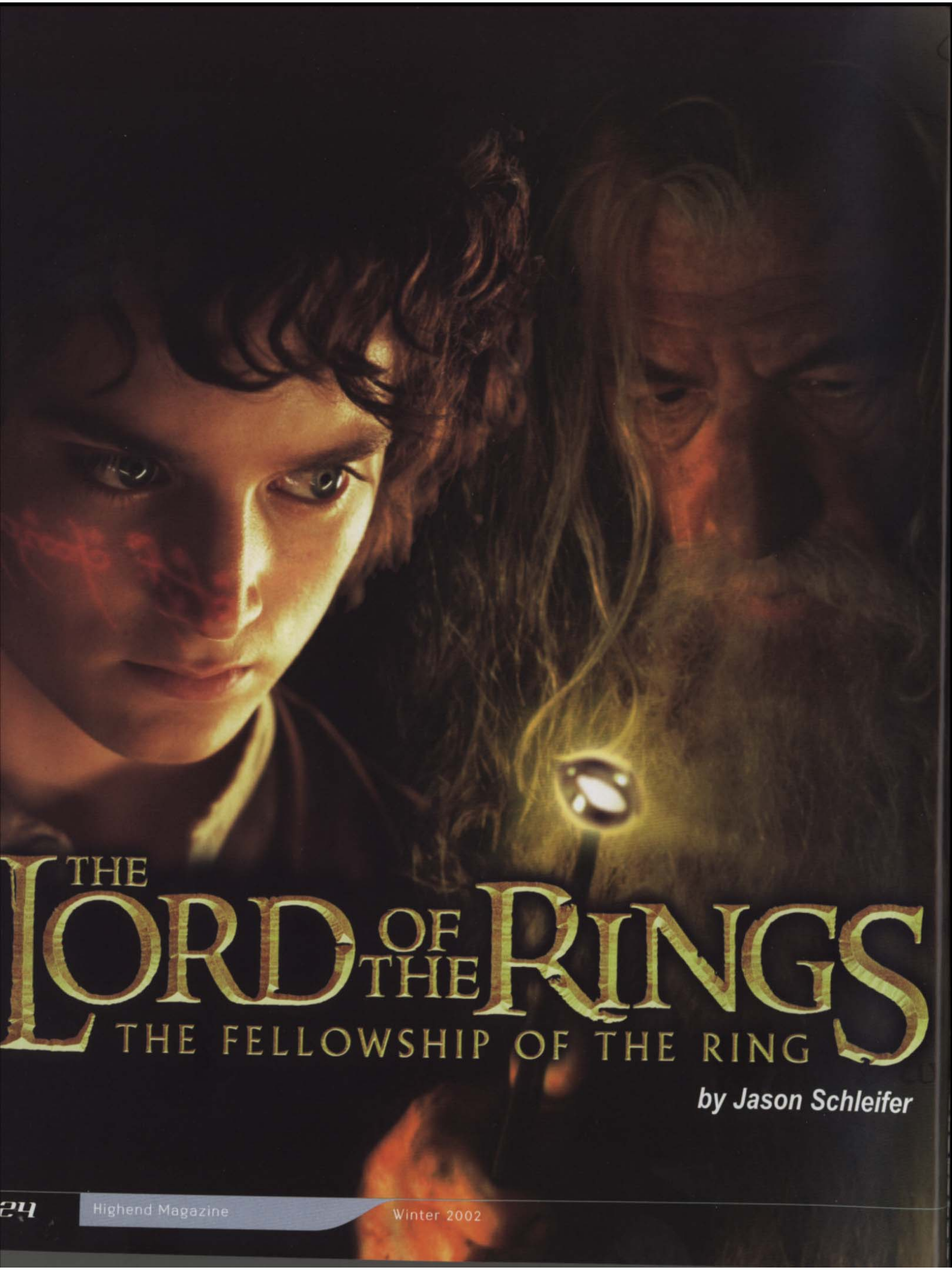


THE LORD OF THE RINGS

THE FELLOWSHIP OF THE RING

by Jason Schleifer

It's August 1999 and I'm sitting on a plane headed to New Zealand, and I'm nervous as hell. Well, who wouldn't be, really? It's not just the fact that I'm leaving all my friends and family for a new country. It's not that I'm about to put my life in the hands of some guy named Peter Jackson, of whose films I've only seen one (The Frighteners). And it's not the three books I've got sitting in my backpack which I've promised myself that I had to read before starting this job.

I'm nervous because I can't find a pen in order to fill out the customs form that the flight attendant just handed out. Even if I could find a pen, I suddenly realize that I've got my mountain bike with me on the plane, and that there's probably dirt on the tires. Dirt. American dirt going to a remote island. The form specifically asks if you've been in the forest overseas. I imagine my embarrassment as they turn me away at customs (sorry mate!), and I have to return home rejected, having only seen the baggage carousel in one of the most beautiful countries in the world. "You're back! What was the country like?" "Well there was this really nice set of Samsonite luggage.."

Realizing that I've got 10 hours to worry about how exactly to fill out the form, I decide to ask the gentleman sitting to my right if I can borrow a pen. He hands me one, and pulls one out for himself. Thanking him, I reach down into my bag and pull out the little "Welcome to Weta Digital" packet that was sent to help ease the transition. I glance at the man next to me to see how he is filling out his form (a habit I picked up in 7th grade math), and notice he has a "Welcome" packet as well.

"Hi, Jason Schleifer." I offer my hand.

"Mike Perry."

"Weta too, eh?"

He laughs and nods, as I look around wondering how many more of us are crammed onto this flight.

Those were the early days on The Lord of the Rings, when a Monday morning meeting at Digital meant all 30 of us could gather in the kitchen. Before filming even started and the cast list was still full of rumor and conjecture. Before we really knew what kind of scale this project was destined to become.

My first month or so at Weta Digital was spent discovering exactly what existed of the creature pipeline, and how I could best integrate myself into it. At the time there were only three others in the department: Greg Butler, digital creatures supervisor, Jamie Pilgrim and Paul Story, creature technical directors. The man heading up the facial

Once the muscles were defined, it was then possible to apply the skinning solution to the nurbs patches making up the creature. Richard's code generates an influence map based on the distance from the skin to the muscle and bone, automatically creating a fat layer where the distance is greater. In addition to the initial influence map, it's possible to paint slide and stretch maps, informing the system which areas of skin can slide (like an elbow), and which bits are stretchy (the stomach). This came in extremely handy on the back of the Cave Troll, where his back is made up of solid rocky areas which should be less stretchy than the more elastic bits between them.

As Paul was working out the kinks in the muscle system for the Cave Troll, I began working with Randy Cook, Animation Director, and Adam Valdez, Motion Supervisor, on the animation rig, or "puppet". We knew that we were going to have animators from all walks of life working on this film, from traditional 2d animators, to stop motion, to 3d animators, so it was extremely important to develop a rig which was easy to use and understand. Thus we developed a number of key concepts for each of the puppets.

Iconographic Control.

The animators could easily tell the difference between a hand control, a root control, and a foot control. Just using selection handles would not do it. We decided to use nurbs curves which we could shape and mould to look like something more interesting than a little "+" sign.

Consistent Orientation.

The orientations of all controls were made consistent and logical. If an animator was trying to move something in the Y-axis, and it ended up moving a little in Z and a little in X, then it gets too confusing keep track of.

FK/IK Switching.

FK (Forward Kinematics) work great for animating arms when they're gesturing and moving around without actually contacting anything. IK (Inverse Kinematics) is fantastic if you need to lock a character's hand to something (table, floor, etc). However, combining the two was not an easy thing to do in Maya at the time we were developing the animation system. Thus I ended up writing scripts to allow the animators to toggle back and forth between forward and inverse kinematics, whereby they could pose the hand in IK, click a button, and it would immediately switch to FK, keeping the arm in the same position.

Stretchy Back Solution.

Knowing that a few of our creatures were going to be on their hands and knees a lot, we spent a considerable amount of time developing a method for being able to place the shoulders somewhere, and manipulate the hips without modifying the shoulders or head of the creature. In order to do this correctly, we ended up allowing the back to stretch a little. It forced the animator the pay more attention to the poses they were making, but the puppet "felt" much more responsive, and the results were much more predictable than what we achieved by not allowing the stretching.

Speed.

We spent lots of time optimizing the puppets, converting long expressions to groups of utility nodes, and cutting out extra geometry and hiding control structures that weren't needed.

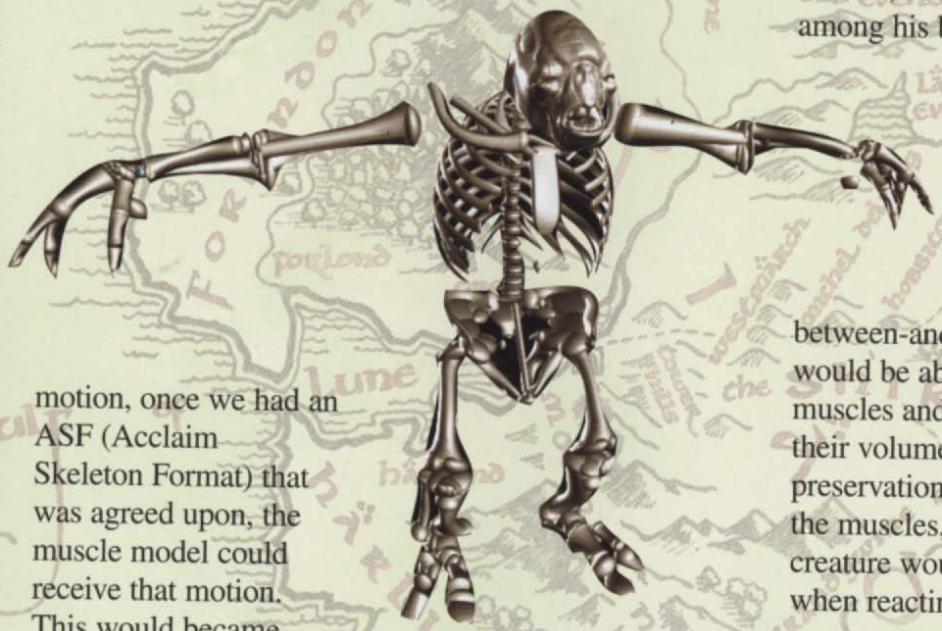
Independent Control.

As much as possible, we wanted to allow the animators to tweak certain parts of the body without affecting other areas. For example, they were able to position the head at an angle they liked, and then later go back and tweak the shoulders without having to re-pose the head.

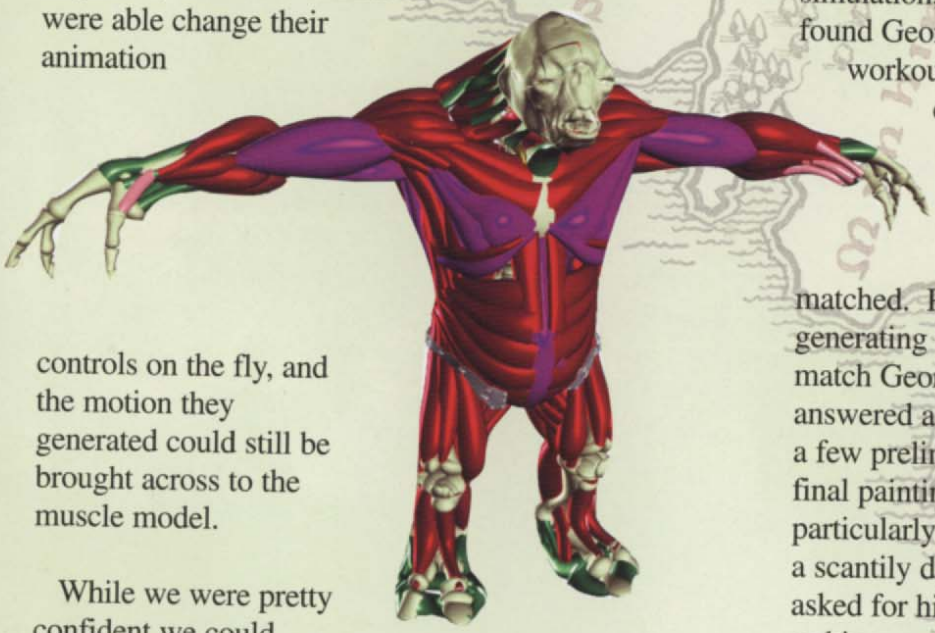
Obviously, it took quite a while to develop all the proper techniques and setups for the creatures. As the animators played with the rigs, they had more and more ideas, comments and criticisms, quite often sending me back to the drawing board to try and figure out some way to solve the problems. After doing manual fixes and tweaks for a while, I realized that with nine members of the Fellowship, all needing "digital doubles" (computer generated versions of the actors), I would never be able to keep all our creatures up to the same standards if I had to update every puppet by hand when a change needed to be made. So we developed a method of generating the puppets with Mel scripts. A whole pipeline was built with the intention of being able to write a series of commands to generate, say, an inverse kinematics arm, and then put that on all the puppets in a matter of seconds. Puppet upkeep became a matter of simply typing a command into a Unix or Linux shell, and in less than ten seconds a new version of the rig would be generated. Given the fact that all of our bipedal creatures were

animation area of creatures, Bay Raitt, showed up a few weeks later.

The pipeline centered around the fact that we had to be able to handle three different types of character motion: motion capture, procedural, and hand-keyframed. In order to facilitate this, Weta had decided to use the Acclaim motion capture format for transferring animation. What this allowed us to do was define one skeleton, which all three departments could use. Then, the creatures department would base the deformation rig, or "muscle model", on that skeleton. That way, no matter what type of system generated the



motion, once we had an ASF (Acclaim Skeleton Format) that was agreed upon, the muscle model could receive that motion. This would became extremely useful during the Watcher sequence, where the animators were able change their animation



controls on the fly, and the motion they generated could still be brought across to the muscle model.

While we were pretty confident we could achieve the type of motion needed to complete the Cave Troll, there was still some question as to how we would deal with his skin deformation. Traditional skinning methods (soft and rigid binds) have distinct limitations in providing how the skin should move, mainly based on the fact that they're deforming skin from a rotation somewhere deep inside the skin. Real skin is affected by layers of bone, fat, muscle, and cartilage. We wanted people to actually perceive the Troll's skin to be made up of all these layers, for people to think that the motion they see in his chest was actually caused by the "real" motion of the Troll's ribs pressing against the skin, not by 10% of his hip motion, 30% of his belly, and 60% divided evenly among his back bones.

About a year before I arrived, Richard Addison Wood, head of the code department, had begun to develop a muscle model and skinning system as a plugin to Maya. His system was based on the idea of stretching muscles between-and along-other bones and muscles. One would be able to choose attachment points for the muscles and, once generated, the muscles will maintain their volume when deforming. In addition to volume preservation, it's possible to add dynamics, hand sculpt the muscles, and even add "flex states" for when the creature would, for example, tighten their muscles when reacting sub-consciously to something.

To ensure the validity and accuracy of the muscle simulation, we searched for "the perfect man". We found George, a personal trainer at the local Les Mills workout facility. George was filmed and motion captured in a g-string (settle down), performing various acts in order for us to see how his muscles worked. We then applied that motion to our creature rig and tweaked the muscles until they matched. Paul Story spent thousands of hours generating a realistic skeleton and muscle model to match George's anatomical features. As Ian McKellen answered a fan's question on his web-site, "I have seen a few preliminary effects, sketches, as it were, for the final painting. Even at this stage they look convincing; particularly a digitalized fight between a cave troll and a scantily dressed muscle-man who was so impressive I asked for his name. Unfortunately he was as artificial as his opponent."

(http://www.mckellen.com/epost/l000822.htm)

based on different scalings of the same ASF, we could generate completely new puppet rigs in a few minutes instead of a few days.

The facial animation rigs were also generated in a similar fashion. Bay Raitt developed a system whereby he could model various face shapes based on muscle poses in Mirai, and write them out as individual obj's. This wasn't just a standard blendshape system, however. In addition to the standard muscle pulls, he also would model corrective shapes and in-between shapes. We then wrote a number of Mel scripts, which would import those shapes into Maya, and automatically generate a number of expressions and node structures to control them. There were a few types of expressions automatically generated by the scripts that gave us the proper behavior.

The first was something we called "Binomial blending". These expressions would automatically toggle the corrective shapes on and off as certain muscle pulls would be employed. For example, if the animator used a corner mouth pull shape in conjunction with a lip tighten, or grimace, the default shape might not be exactly what Peter Jackson would want. So Bay would model a corrective shape for those particular muscle pulls, and the binomial expression would smoothly transition that shape in when the others were toggled. It worked somewhat like setDrivenKeys, except based on multiple inputs.

The next series of expressions was based on a concept called a "dominance table". Some muscle pulls are just physically impossible when another muscle is acting, so we would have a series of expressions allowing certain muscles to be more dominant than others. If, for example, cornerPull was set to full influence, then no matter what the animator did with cornerForward, it wouldn't take effect because cornerPull was the dominating shape. This also helped limit the number of corrective shapes that were needed.

By this point we were feeling pretty confident that we would be able to tackle any of the normal creatures that came our way. The skinning code was getter better and better each day, the motion was coming across, puppets were getting more consistent and solid, and we were able to start adapting our techniques to other creatures, the troll, the fellbeast, and balrog. All in all, we were feeling pretty good.

Then came one of the most challenging creatures in the Fellowship of the Ring, the Watcher. The Watcher is the under-water creature that attacks the Fellowship outside the Mines of Moria. Described in Tolkien's book as a number of sinuous tentacles grabbing at Frodo and the Fellowship, the design was left open to quite a bit of interpretation. Richard Taylor, Director of Weta Workshop, and his team worked to develop a unique creature that no one had seen before. As most of the creatures in Middle Earth have anatomical parallels to modern day animals, so too does the Watcher.

By starting with an extensive array of ancient undersea creatures, and Tolkien's description, the team came up with a truly unique character. It is comprised of twelve tentacles emanating out from a large squid-like head. Each tentacle has three fingers with a series of suckers on the bottom of each digit. The undersides of the tentacles are ribbed, while the tops are smooth and slimy. Like a crocodile, the creature has two eyes placed on the top of its head. Six flaps around the head normally stay close to the skin, but flare out when it's enraged. The top of the head leading to the flaps is hard and bony, but the front of the Watcher's face is full of draping skin and blubber. The Watcher's mouth sits in the middle of all this fat, and spends most of its time folded in on itself. To open, the mouth unfolds from within the body into fully articulated lips and a dazzling array of sharp teeth. Add to this the fact that the Watcher spends most of its time in and out of water thrashing the Fellowship, which of course it would have to interact with, and we had a serious series of problems to tackle.

By the time the Watcher sequence started (over one year after I had started working on LOTR), the look of the creature department had changed a bit. We had grown in size to eight, with Eric Saindon now taking on the supervisor role. Greg Butler had moved onto act as the 3D lead for the Watcher sequence. One of the first challenges that we had to overcome was the same challenge that was an issue throughout the entire production: scale.

The first issue of scale was a relatively simple one, how big should the Watcher be? Butler recalls, "If he's too big, then Frodo can't survive. However, if he's too small he looks like a bath toy. Eventually, it came down to Peter Jackson holding up a sculpted macquette of a Watcher tentacle. He put the hand of the tentacle in front of his face and said, `if I'm a hobbit, this hand is at scale'."

That took care of the scale for the tentacles and hands, but what about the head? In the end, we took the digital double version of Frodo and scaled the head until he could fit inside the Watcher's mouth. Once these two parameters were known, we could taper down to fit the appropriate size for the hands and we had the size of the Watcher nailed.

The next item to deal with in terms of scale was the disparity between humans and hobbits. Hobbits in the film are around 4' 2" tall. All the hobbit actors were played by normally sized actors, so first we had to deal with all the standard problems the rest of the production was facing in making it appear that the hobbits were almost half the size of the humans. In addition to this, however, the Watcher directly interacted with the hobbits (both digital double and actors) and humans. In order to keep things as simple as possible all creatures had been modeled in the same scale. However, this meant that while the scenes where the Watcher interacted with the actors playing humans were at the correct scale, if there was an actor playing a hobbit the Watcher would seem too small. To solve this, every shot had to be categorized as either hobbit scale or human scale.

"If the shot was human scale", Butler states, "the shot was treated as normal, and delivered according to the survey data. However, if it was deemed hobbit scale, we wanted the Watcher to appear bigger, so we would scale the entire world smaller based on a pivot point at the location of the camera."

Luckily, there were only a few shots that had both humans and hobbits together, and those we were able to scale in 2D.

Frodo was another issue entirely. There were a series of debates as to which scenes would use a digital double for him, and which would be bluescreen shoots of Elijah Wood. While we attempted a number of bluescreen integrations, we found that most of the bluescreen had been shot with wide-angle lenses (16 mm), and the Watcher sequence had been shot with a

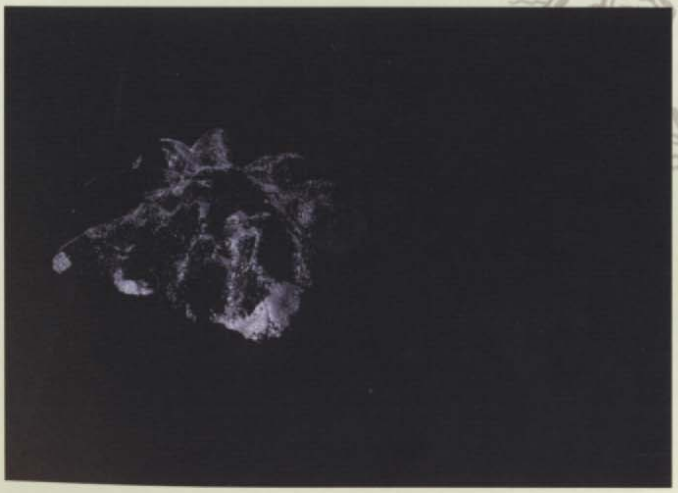
28 mm lens. This caused problems around edges of frame where Frodo's legs appeared to grow and deform. In the end, mostly digital versions of Frodo were used, due to the specific interaction needed between Frodo and the Watcher. Most of the kinks in the digital doubles had been worked out in the Troll sequence where we had a number of shots where digital versions of the fellowship attack the Troll.

To help determine some of the deformation requirements for the Watcher, and to get a better idea of its "character", the creatures and shaders team took a trip down the road to NIWA (National Institute of Water and Atmospheric Research) where they had a giant squid we could check out. These squids are extremely elusive, and are quite impressive to behold, and smell.

The man showing us the huge beast warned of the staying power that the squid's stench holds before we all dug in with rubber gloves, checking out the flexibility of the tentacles and taking pictures of its skin. The squid we saw was about twenty-six feet long, a little less than half the sixty-foot maximum size for their species. It was impressive to see the scale of this creature, and it certainly helped the team focus on some of the issues.

The Watcher puppet is definitely one of the most complicated animation rigs created for the film. Each of the twelve tentacles has 28 joints going from the base of the body to the beginning of where the digits split off. Each digit has between 8 to 12 joints in order to ensure smooth deformations. Initially, I had planned on using splineIk to control all the tentacles. However, once we started investigating what the Watcher would need to do in the sequence, we realized that just using splineIk wouldn't be successful because we needed be able to lock both the start and end of the tentacles to specific points. To ensure this, we wrote expressions to allow the tentacles to stretch based on the length of the curve controlling their individual splineIk. This allowed the animators to place the "hands" of the Watcher where they needed to interact with the fellowship, and still move the tentacles around in a sinuous way.

Unfortunately, not all tentacle motion worked well with this new "tentacle inverse kinematics" method. Some shots required the tentacles to be animated with forward kinematics. Others needed only some of the tentacles to be forward kinematics, and others to be inverse kinematics. One of the shots required half of a tentacle to be IK, and the second half to be FK. This is where the ASF/AMC pipeline really came in handy. We were able to make



modifications to individual animators puppets, deleting and adding controls where needed, and because all the animation was exported based on the joint translations and rotations, the muscle model could still accept any animation we sent it.

At this point I had begun my transition to the motion department, receiving a few of the Watcher shots to animate myself. I soon realized that I would never have time to animate my shots if I had to answer all the animators' requests for tentacle control changes every time they wanted to start a new tentacle. I wrote a "tentacle control manager" that would allow the animator to change the tentacle controls between forward and inverse kinematics on

the fly. This freed the animators up to experiment with different control structures, find what they were comfortable with, and use the appropriate control for the appropriate situation, without needing to request changes from me or the creatures department.

As shots began to come together, the 2D and 3D teams were hard at work developing methods for dealing with the water interaction. We ended up using a combination of methods including:

2D Splash elements
Live water plates
Specific live action water and splash elements for two shots
3D sprays and drips generated in Houdini
Internal wave simulation code - generated a 2D warp map for warping the photographic plate

Foam elements -
sprites which were attached to particles pushing away from intersection between tentacles and 3D generated surface

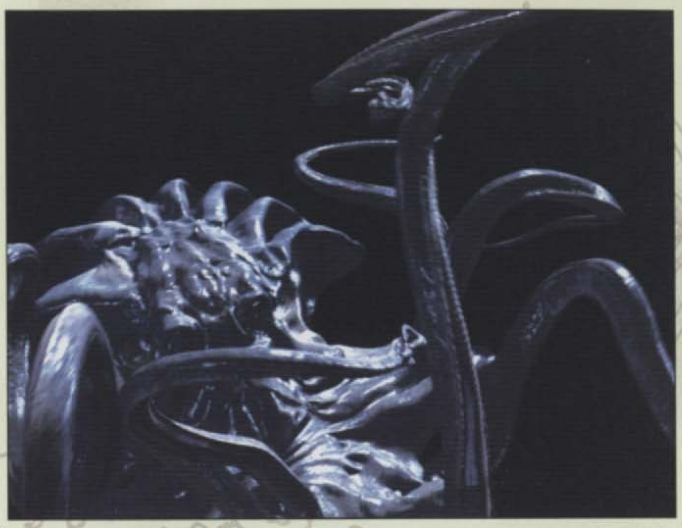
Water integration splash elements -
blobby particles based on intersection between tentacles and 3D surface, generated in Maya and rendered in Renderman.

Water coursing off the surface of the Watcher–
blobby particles generated in Houdini.

One of the most interesting techniques used to integrate the Watcher with the water surrounding it was an image based collision technique that Mike Perry and the rest of the FX team developed within Houdini. They would render depth and normal

passes of the Watcher from a top orthogonal view. Then they would use a custom Houdini SOP that Mike wrote that would look at the position of the Watcher for the previous and current frames. For each vertex, the SOP would determine whether that point had just emerged from the water. If that were true, it would turn the point white, while keeping the rest of the Watcher that was still under the water black.

At this point, the team would have three sets of images for the sequence all from the same orthographic view above the Watcher; a depth pass, a normal pass, and a "surfacing" pass. The great thing about this technique is that these images are all they would use for calculating the collision of the water with the surface. Perry explains, "images are great for this, they have a fixed cost [their resolution], and the complexity of the model is irrelevant."



The idea was to use the surface maps to determine emission points for the particles to run down the surface. To do this, they dynamically created geometry in Houdini based on areas in the images where the tone was brighter than a certain threshold. "These became our emission objects, we only emitted water where the watcher had surfaced. In our particle system, we applied all the standard physics, air friction, gravity, etc. We then use a custom POP that does image-based collision based on the normal and depth images. The POP ensures that the water rolls down the surface described by the images."

The compositing team, headed by Paul Kirwan, expertly managed all these elements and more, mixing humans, hobbits, digital doubles, matte paintings, 3D generated FX, and 2D splash elements into a well tuned sequence.

In total, Weta Digital produced upwards of 400 shots for the first film in the trilogy. Not too shabby for a facility that really started from the ground up for this production. While the Fellowship of the Ring is finished, the Lord of the Rings is far from over. Taking what we've learned over the past few years, Weta Digital is now feverishly working on The Two Towers. The next two films promise to be even more intense and difficult than the first. A frightening and daunting task for if we've done as well as we hope with Fellowship of the Ring, there is a lot to live up to. However, when I think about the talented people working together to bring this piece to life, I have no doubt in my mind that while the next two years may be tough, they will no doubt be extremely rewarding and satisfying.

Korn

Worms and Sewers

by: Tristan Maduro, Seth Hall and Tyson Cross.

Sphincter Tunnel

By Tristin Maduro

I was recently hired by V Squared Labs to create animated sequences as concert visuals for the band Korn. Vello Virkhaus, the animation director, provided rough concept sketches and guidelines. I was given three weeks to complete both the 3d animation and all compositing on three, six second long sequences. These sequences could be described as motion ride like sequences that were to serve as transitions between different cameras during the live video mixes of the concert. The mood of these pieces was to be "dark" and the environment needed to resemble some sort of internal biological tunnel with lots of veins on the walls. The camera was to fly through the environment encountering various "landmarks" one of which was a giant quivering sphincter. So, the sequence became known as the sphincter tunnel.

Later revisions included the addition of animated worms crawling around on the surfaces of the tunnel with the band member's faces.

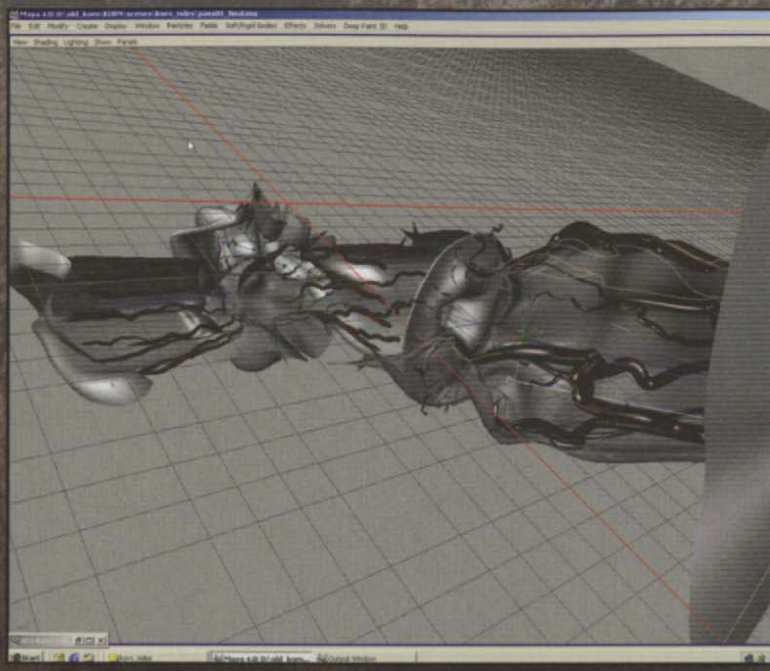
The key issue encountered during this project was the short time in which I was required to complete it. This made it absolutely critical to convey to the director that a certain amount of creative flexibility was going to be necessary. It was also critical for me to choose time saving techniques.

I segmented the environment into pieces and grouped those pieces with accessory surface details (vein objects and worms). This helped to speed light linking and overall organization.

I chose to light the scene in a more theatrical style given the subject matter and because it was going to work to my advantage to accentuate areas where I wanted to draw the viewers interest and push undesirable areas out of focus. Light linking became very necessary with hundreds of separate shadow casting pieces of geometry and the many lights necessary to create separate and distinct areas of interest throughout the scene.

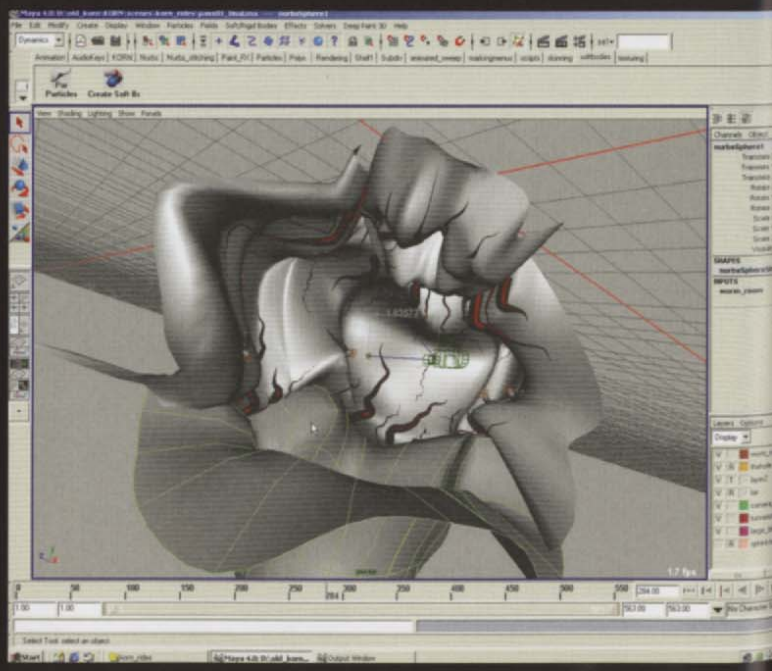
The worms were distributed throughout the environment and each band member worm was given it's own area with it's own three point lighting setup as well as an extra bounce light with its color sampled from the surface that the worm was resting on.

The addition of the worms came about a week and a



half before delivery and there was little time for me to model 5 lifelike faces. Instead, I chose to create a single nurbs worm model with very light facial features so that any face could be projected onto it and 5 different sets of textures (each of the band members). The worm model was smooth bound to it's skeleton and given a spline IK setup.

After creating color maps, I used the color maps as guides for custom painted gray scale bump maps of the facial features. Using bump maps as opposed to extensive modeling worked out well in this case given the scale of the scene and how brief the worms were actually in the shot, it gave me some indication of directional lighting on the facial details without the time necessary to model 5 full faces. The eyes and faces of the worms were always menacingly locked into the direction of the



camera as if the camera were an intruder. This dealt with the issue of seeing the lack of detail on the face geometry in profile. If this had become a great problem, I may have employed the same bump map in a displacement map, perhaps giving me the surface detail needed; but in this case, the bumps were enough. I then projected the texture maps onto the blank facial area of the worm using a planar projection. After positioning the planar projections, I parented the planar projection manipulators to the head rotation bone so that the face texture projection would turn in the same direction as the head. It occurred to me that I might want to create an image sequence in a compositing program for some eye animation or even some facial texture animation. Baking textures wasn't going to work, since I needed the option of being able to use image sequences. I could have alternatively used a texture reference object to hold the textures onto a reference surface while I animated the original, but parenting the projection manipulators was convenient to me.

I kept the number of texture maps down wherever possible by creating "all purpose" tile able textures. Then I tweaked the number of repeats, rotation, etc. on the texture placement nodes per object until I got nice variation.

While in some cases one might require a far more involved approach to fulfill the requirements of a project, I often find that the simplest approach works best.

Many thanks to Vello Virkaus, Tyson Cross, Jericho Green and Seth Hall for sharing with me an abundance of your knowledge and artistry during this project.

Tristan Maduro, tristanmaduro@yahoo.com

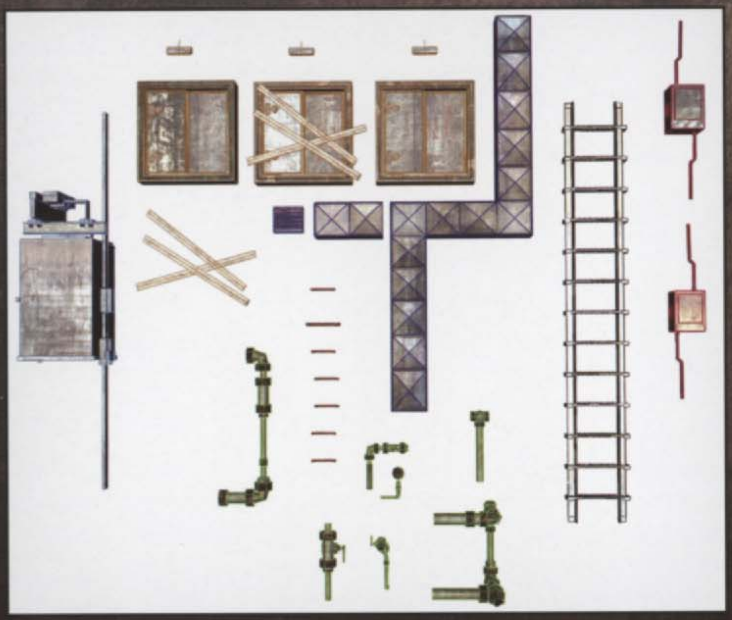
ELEVATOR SHAFTS AND FILTHY SEWERS

Written By Tyson Cross
Images By Seth Hall

"Viscous, Dark and Scary! You know those nice safe roller coasters where you slide along safely and smoothly? I want this to be the exact opposite of that!" These were the instructions that myself and two of my Gnomon classmates were given by animation director Vello Virkhaus, for a shot involving the camera dropping down a dark elevator shaft at high speed. We were full-time certificate students in our fifth term at the Gnomon School of visual effects and we were working on creating CG concert footage for Korn's live concert in New York. The three of us, Seth Hall, Jericho Green and myself, Tyson Cross, were given three weeks to put together three separate environments, with several 6 second camera passes for each location. Along with the abandoned elevator shaft, we were to build a twisting tunnel of crowded conduits and a filthy sewer tunnel filled with a layer of dark slime and thick fog. The footage was going to be composited, live, into the concert camera as it swooped around the band, ducking into band members' mouths and close-ups of instruments, seemingly shooting down ears and other orifices into decaying corridors of rust and terror. Surrounded by flickering screens of disturbing imagery, Vello, the founder of Burbank-based V2 studios sent us on our way with a few quick sketches of the respective environments and instructions to "scare him."

Rather than have each of us complete an environment on our own, we elected to design a short pipeline, which would allow us to concentrate on contributing in the area of our specific skill sets. We all ended up doing at least one same task on each of the tunnels, as well as little bit of everything, but initially Jericho was the modeler and responsible for laying out the UVs, while Seth and I lit and textured. We used Maya and Photoshop almost exclusively for the project, with a little compositing and tweaking in After Effects and Shake. We communicated with the various members of the larger Korn project via email and FTP uploads of renders and Quicktime playblasts.

The first tunnel we tackled was the elevator. Our initial design, in which we overestimated the length of the shaft, was to have a camera at the origin with a "looping" tunnel of segmented geometry moving upwards around it. After a few tests we abandoned this idea in favor of a tunnel divided up into seamless sections that would simply move up on the Y once. The interior details would be made up of a small library of pipes and cables Jericho built, which we could duplicate and assemble like Lego with a few variations of the basic texture maps to avoid obvious "tiling".



Sample of Library

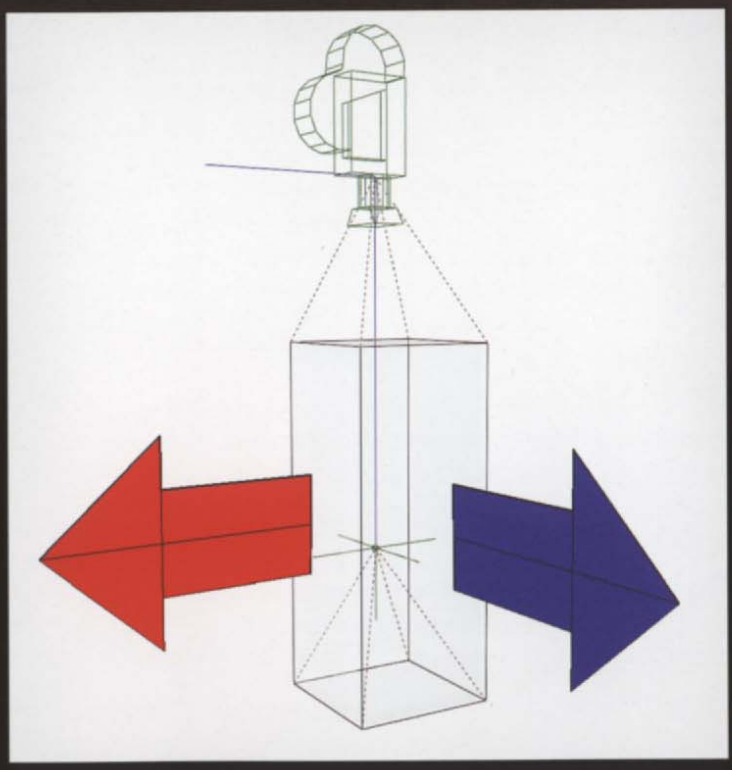
Our first task was to design a (partially) dynamically driven camera setup, which would give a certain amount of "random," lurching motion while still allowing us to manipulate and adjust the camera manually. We constrained the main camera and then the aim node of a three-node camera to two separate single particle shapes which were attached with springs to two opposite faces of a polygonal box. The up node of the camera was manually keyframed. The translation values of the box in X and Y were controlled by noise expressions to generate sharp, jumpy motions.

The spring system was pulled smoothly along by the sharply jagged motion of the box, resulting in the camera swinging forward and side-to-side with motion-sickness-inducing Vomit-Vision. Vello loved it.

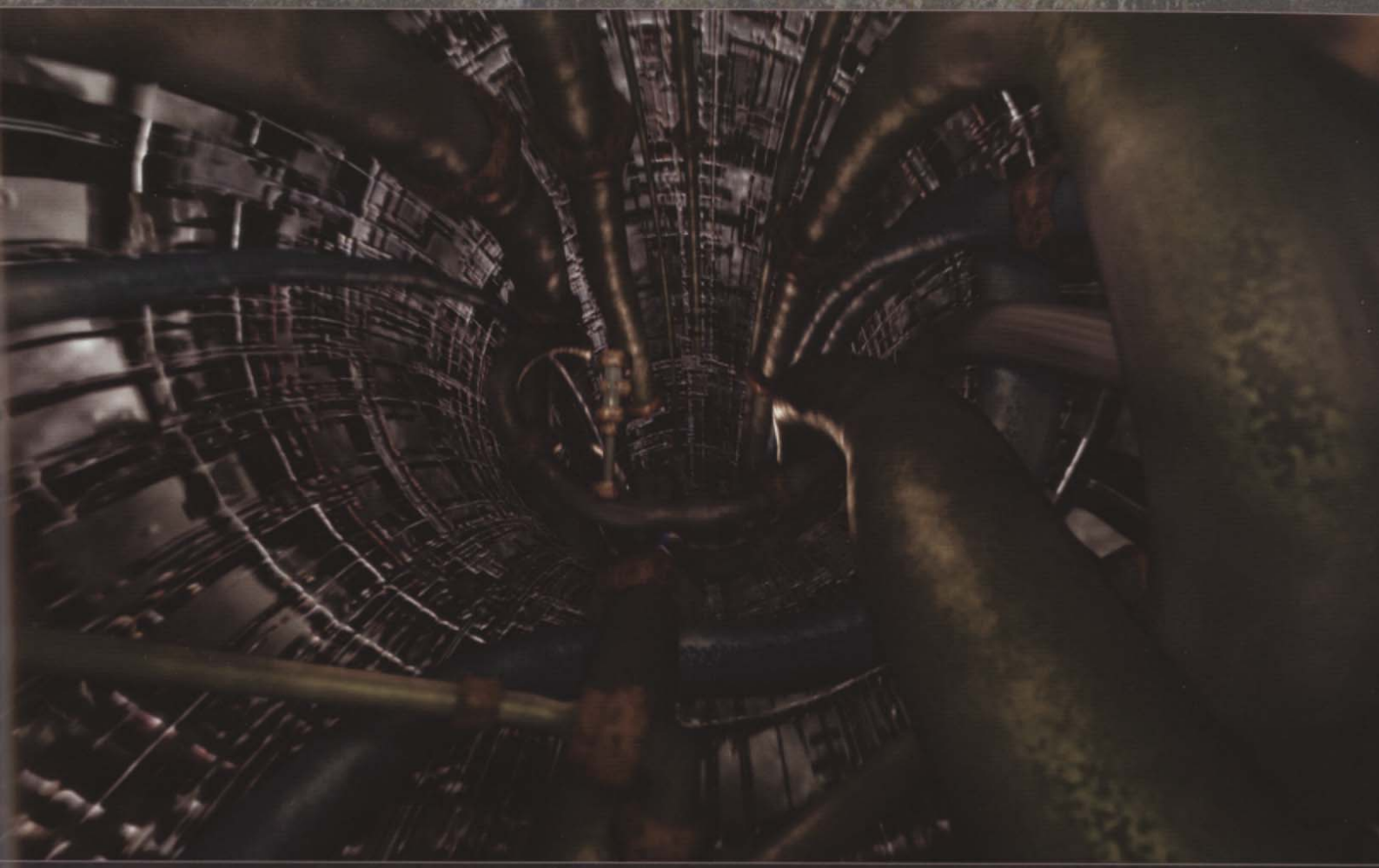
We split the tunnel up into seven sections (this actually turned out to be too long as well, resulting in somewhat extreme camera speeds) with a different texture and bump maps per piece for variety. Once Jericho had assembled the various bits of piping, ventilation tubes, broken elevators, cables, fans and vents into a library, we could assemble the interior of the shaft. We also threw in some simple planes with mapped transparency to achieve a certain level of complexity for the eye. To light the first tunnel we established a series of sources within the environment – wall lights and electrical boxes giving off sparks. As the camera fell deeper into the tunnel, the slight amount of natural light disappeared in lieu of purely artificial, flickering man-made sources. After we had approval on the camera passes, we started dividing up other tasks. I began lighting the elevator shaft, and Seth and Jericho started work on constructing the next environment.

Having realized the problems with the first tunnel, which was somewhat excessively heavy on geometry detail, and as mentioned, was too long, we approached the construction of the second environment differently. We had to build a conduit tunnel filled with tubes and escaping steam. Seth made a NURBS plane live and drew a network of curves on the surface. Points were moved around to fix intersecting lines, and then circles were extruded along these curves to form a series of intertwined pipes. We wrapped up the NURBS plane into a cylinder and deformed it into the shape of the twisting tunnel.

Some 2d pipes maps and distressed-metal textures on an inner cylinder increased the visual complexity, and added to the oppressive atmosphere. Seth went to work on texturing and lighting his tunnel while Jericho started modeling the sections needed for the last Korn location – a dank and rotten sewer filled with shafts of pale light shining through the



Particle Camera Setup



effluvium, revealing rotting ooze.

The sewer was assembled out like a toy train track, with corner sections and straight passages. Again we used our useful library of pipes and various other easily assembled sections of geometry detail. I built a few variations of a single texture map for each of the sewer sections, and Jericho constructed our sewer environment along with three sweeping camera passes on motion paths. As the deadline approached, we began to get closer to the final look of the nine shots, adding and tweaking as per Vello's specifications. We were saved the panic of trying to coordinate the rendering of almost 1700 frames (at around 6 min per frame on the slower of our three computers) by the timely and generous loan of a render farm at the Jim Henson Creature Shop. This extremely useful and unexpected resource was organised by Tristan Maduro, who was working on another tunnel for the concert. Disaster almost struck when we realized the sewer scene had become corrupted, necessitating the appropriation of an empty workstation the very kind folks at the Creature Shop let me use to salvage the horribly mutilated geometry and rebuild the scene. That panic-stricken eleventh-hour drama concluded the rendered and color-corrected frames were delivered to View Studios, where Vello and the concert director from Gray & Balding were assembling the various elements of concert footage.

Aside from the final hiccup, the loss of a few nights sleep, and becoming enured to nightmares of falling down dark holes, the opportunity to work on a professional project with public exposure and high production standards was an invaluable experience. The importance of careful preparation for all aspects of production pipeline was made evident, and the value of clear communication and designation of responsibility within a team was an important lesson the three of us learned. Aside from the experience, though, we are just glad that we could make a small contribution to pushing the limits on creating sick and twisted environments for headbanging kids to mosh to!

Thank to Alex Alvarez, Tristan Maduro, Vello Virkhaus, The Creature Shop (LA)

Gallery

Christof Stanits/Thomas Schleischitz

Workplace
RABCAT entertainment
Email Address
mail@rabcat.com
Highend Username
RABCAT entertainment
Software used
A/W Maya 4.0 Unlimited
Adobe Photoshop 6.0
(Compositing)
Hardware used
HP X2000 SPU
Windows 2000
Render Time
1 Hour for all parts

Rocky and Iwan are main characters created for a CG TV series. They were awarded at the "Animago", the most important animation-award in the german-speaking area in the category "Professional/ Still/Creatures", where the creation and realization of a 3D-cartoon character (creature) was rated.

Workplace
Optidigit, Kuala Lumpur, Malaysia
Email Address
stahlber@optidigit.com
Highend Username
Stahlberg
Software used
Maya Unlimited v3.0
Photoshop
Hardware used
3DBoxx from Boxx Technologies
Render Time
About 15 Minutes

I mostly used my own morph target-based rigging system and Emmanuel Campin's Spherelight

Seung Ho Henrik Holmberg

Workplace
The Mill, London
Email Address
henrik.holmberg@spray.se
Highend Username
henrik
Software used
Adobe Photoshop 5.5
Hardware used
Athlon 1200, 640 MB RAM, 40 GB HDD, 19' screen and a Wacom Intuos A4 (9x12).

I don't consider my technique to be that special, everything is quite straight forward about the way I work. I use the paintbrush tool and work on one layer mostly, roughing up the major shapes and colors at first,without paying too much attention to detail. When doing things this big, your overall impression of the image is number 1. It's impossible tostart rendering details if the overall impression is not working. When working, I tend to have 2 windows open simultaneously. One zoomed in, and one zoomed out. This enables me to work both on detail and overall look at the same time. I completed this in a few days.
Time to complete the image was a few days.
My work ranges from matte painting to conceptual design and story boards.

Chen QingFeng

Workplace
China
Email Address
cqfcqfcqf@sina.com
Highend Username
chenqingfeng
Software used
autocad+lightscape
Hardware used
p3-500mhz,256mb
Render Time
6 hours

Rico Holmes

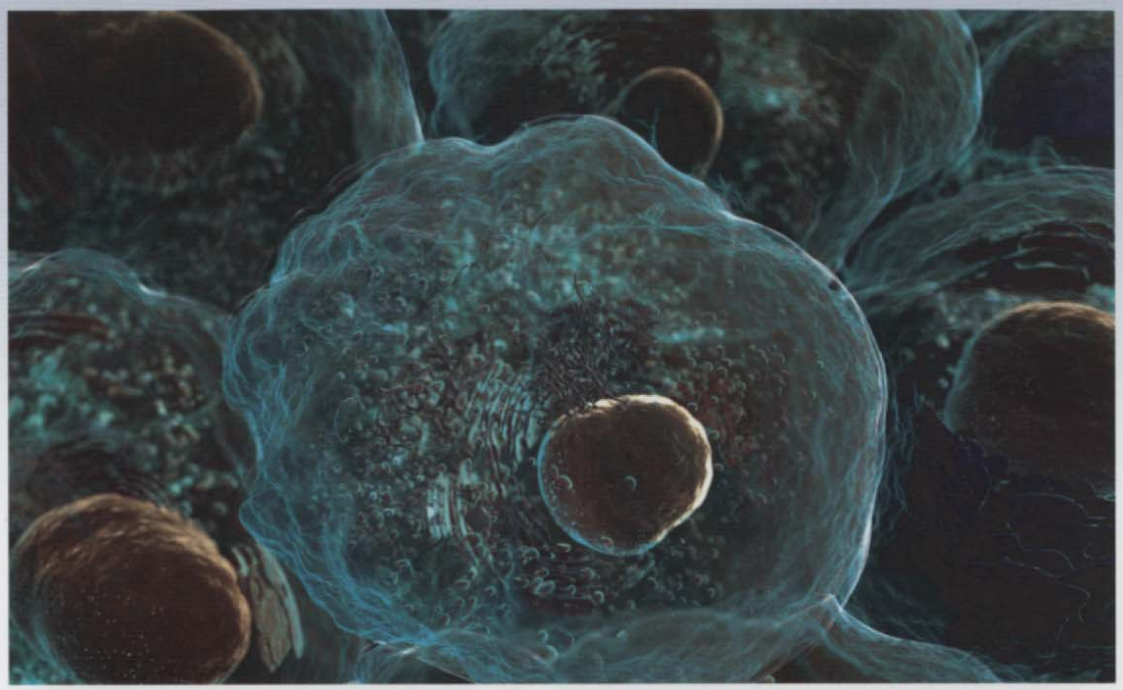
Workplace
Team17 Software (games)
Email Address
Rico.Holmes@team17.com
Highend Username
Reeks
Software used
Maya, Photoshop
Hardware used
Single standard PC
(AMD 1.6)

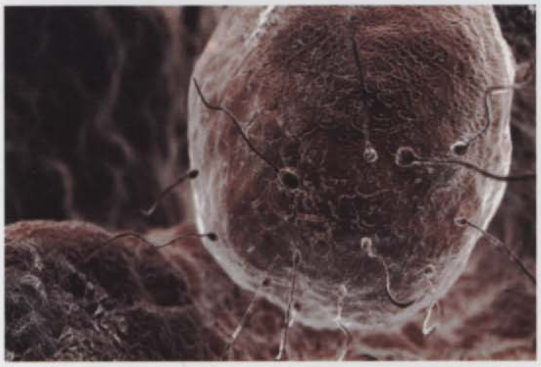
Partly modelled in Maya, partly painted in Photoshop. As this image was intended to be a purely 2D "painting", the modeling setup only went as far as designing the creature and lighting- the smaller details were added painterly fashion in photoshop.

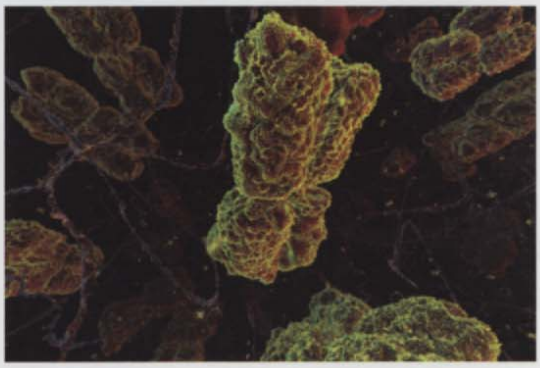
Richard Morris

Workplace
The Mill, London UK
Email Address
jackal@jackals-forge.com
Highend Username
jackal
Software used
Maya & Renderman
Hardware used
Octane, 22 proc. Linux Renderman renderfarm (800mhz pentiums)
Render Time
up to 3 hours a frame

These images took a lot of patience, hard work and fiddling around with shaders.







Alceu Baptistão

Workplace
Partner and director at Vetor Zero, a CG/FX/postproduction house in Brazil
Email Address
alceu@vetorzero.com.br
Highend Username
Alceu
Software used
Maya 4.02, Photoshop
Hardware used
Dual Pentium Xeon 1.7 Ghz, 1Mb ram, Elsa Quadro III
Render Time
About 1 hour at 3500x2625

Workplace
Ubisoft Canada
Email Address
lobo971@yahoo.com
Highend Username
pascal blanché
Software used
3DsMax4.21, Arnold renderer, Photoshop
Hardware used
Dual-pentium3 1.2 ghz
1 gig ram
Render Time

I created this image based on one of the characters you find in the Tarot of Marseille (old divination cards) it's fully modelled with Max, Box modelling techniques, Meshsmooth set at 1. the clothes are done with Simcloth simulations then the whole scene rendered with Arnold, then touched up with Photoshop. The image took about 40 hours to complete.

Workplace
Freelance
Email Address
soa@soanala.com
Highend Username
Soa Lee
Software used
3D studio Max, Maya, Photoshop
Hardware used
Pentium III - 512MB
Render Time
about 20 min

I try to pursue a great illustration rather than a 'full 3D' image.

David Komorowski

Workplace
Modeler/Animator
Fathom Studios
Email Address
DaveK@theHobbitGuy.com
Highend Username
Dragon
Software used
Maya, Deep Paint 3D, Photoshop
Hardware used
P4, 1.8ghz w/ 512mb ram and a Quadropro2 graphics card

Artist Spotlight

Robert Kuczera

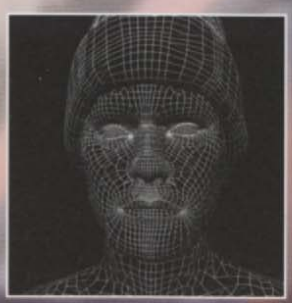
Name:	Robert Kuczera
Age:	29 years
Family Status:	Single
City of Residence:	Germany / Stuttgart
College or schooling background:	Germany Abitur 1993 / Filmakademie Badenwürtemberg 2003
Length of time doing visual effects:	since 1994
Past Work Places:	Black Mountain, The Light Works, Tevox etc...

What are your favorite movies?

My favorite movies are City of Lost Children, Akira, U-Turn, Delicatessen, Amelie, Natural Born Killers.

What is your focus/position at your current job?

My current job is focused on coordination and animation, but depending on the job, I also may focus on modeling, texturing and setup.



How do you conceptualize your work/ideas?
First, I take a look at the time I have. Based upon that, I break the job into parts (example: modelling, texturing, and animation). Next, I use the concept painting to model the character. Following that is texturing, and then the Setup (Skeleton) & the blend (Shapes). After each step, I attempt to obtain approval from the customer or from my supervisor before going to the next step. As I work on each part, I visualize what the character be able to do. Questions such as: does it have to be a nurbs model, a subdivision or poly model (why and what are the advantages/disadvantages); how close will the camera get to the character (this helps determine how much time I should spend on the texture); which features do I have to built into the setup; and etc. My best advice is to plan your steps carefully, which will assist you with meeting deadlines and designing high quality 3d animations or models.

How do you cope with challenges and roadblocks when trying to create realistic looking characters?
First, I attempt to fix the problem on my own, without waisting too much time, since it is very easy for me get lost in finding solutions. The next step would be to ask some people I know for assistance. The next step is to search on the internet (maybe some one else has experienced the same problem and has a solution).

Do you feel satisfied with your results when attempting to create realistic characters?
Perhaps for one day. After that, it is not good enough any longer. I see mistakes more than anyone else since I have worked on it for so long. The question is, how much time can I spend on creating a character. There is a point, where you have to stop.

What are your hobbies or favorite thing to do when you are not working?
a) I like to exercise (usually running) and tone the muscles in my body. I feel it is very important to get a balance from sitting in front of the computer all the day and to get a good feeling for your body. I find it to be very useful for character animation.
b) I like to read books (novels, animation books, etc.).
c) I like to meet some friends, take a drink and enjoy life.
d) I like to advance my education.

What was your dream when you started in 3D?
I think, it was creating new fantasy worlds or see my own fantasies (this was some time ago and I know now that it is a lot of work) and to tell stories.

What is your take on the current status of the 3d animation industry?
I believe it is more important than ever before. In almost each film, there are digital effects, many in combination with 3D Animation. This also takes place in non-effect films. The genre of computer animation has absolutely established and even now stands before the 2D films. More and more 3d films are produced and are wanted. We have come so far, and I think even more is possible. I feel that we are back to the point were the story is the central focus again. All 3D software programs are almost equal, and you can do good things with every software program. It is the artist who is important. The software is cheaper, allowing anyone to be able to afford it.

What kind of advice would you like to give all the college students, aspiring programmers and artists coming into this industry?
I would advise them to get a job in a 3D company and work one or two years in the business as a trainee or intern. This will provide a large overview or background knowledge, and will show them what others in the industry are doing. After two

years, they should concentrate on what they like most (film, animation, etc.). Then, go back to school and focus on the area they are most interested in. It is easy to learn the software, but the knowledge around animation, camera, light or script must be learned on the job to provide practice. I feel the best would be characteristic projects. There are no limitations on the software except your own fantasy.

Do you have any philosophies that you live by, helping make you the person you are?
Ok, here are some of my philosophies, though they may sound a little bit strange to some people.

a) In life, everything happens for a reason. It doesn't matter if it is good or bad, just make the best out of it and try to learn from it.
b) Be thankful for your life every day and try to enjoy it.
c) Life is to short to waste time on bad things or people.
d) Try to find your own way. Listen and trust your inner voice, it will lead you to your aim.
e) Don't make your work the center of your life.

What would you like to see added to 3D software?
I work with Maya. I would like to see a good renderer (example: 3dsMax has about 3 very good renderers - Vray, Brazil and Final Render). In my opinion, they all are very good with Motion Blur, Soft Reflections,
HDRI, Global Illumination, Depth of Field, etc. Maya needs more companies that program plug-ins (like 3DsMax).

What is your take on 3D actors in film (example: any opinions on Final Fantasy)?
3D actors are getting better and better (example: Star Wars: Episode I & Monsters, Inc.), especially if they use it in places where it is useful. In Star Wars, they are used to create non-humans or they are used as stuntmen. I feel that this is Ok. Another reason would be to make someone who is dead, alive by creating a 3D actor of them. In Final Fantasy, they tried to make human characters look realistic, but it didn't work. In my opinion, why make a film by using realistic looking 3D actors. There is no reason for it. It would be better to use real people so you can tell the story, it is cheaper, and the characters are believable. I feel it is more like it was a history of art. They wanted to paint as realistic as possible; and as they reached it (there was also photography), they went different ways in the expression of it. It is the same in 3D. They try to make it as realistic as possible; and if they reach it, it will not be interesting any longer. There are different directions of 3D Animations.

Where or how do you find inspiration?
A lot of inspiration I find on the internet. There are so many good 3D and 2D artists; and sometimes. I get a little depressed when I see good people all over the world. I also find inspiration in 2D art books (examples: Brom, Boris, HR Giger, Krüger, etc.). I also like to use comics (examples: PITT, Battle Chaser, Tellos, Danger Girl, etc.). Sometimes I find inspiration in films with animation and good novels.

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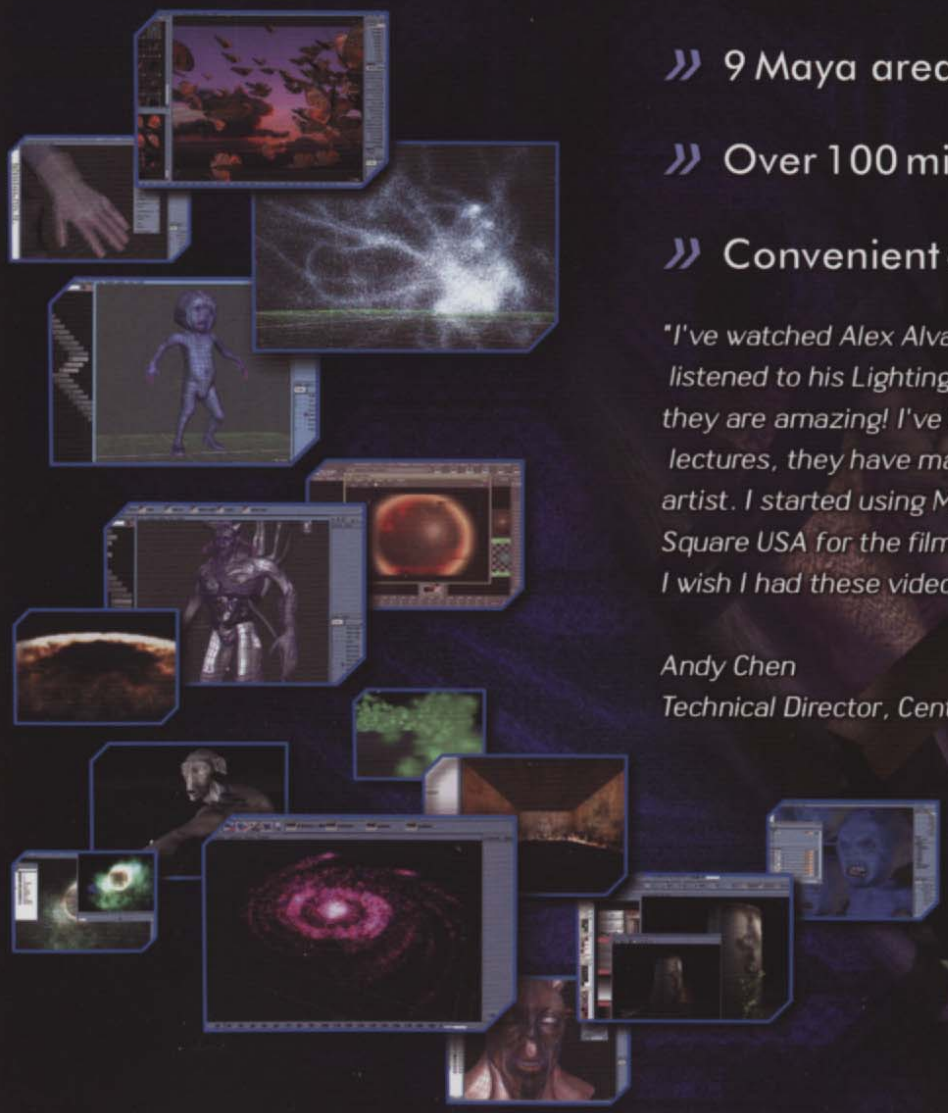

"I've watched Alex Alvarez's training videos on Dynamics and listened to his Lighting/Rendering lectures at Gnomon, and they are amazing! I've learned so much from the videos and lectures, they have made me a much better visual effects artist. I started using Maya for effects animation when I joined Square USA for the film "Final Fantasy" about 4 years ago. I wish I had these videos then. Well, better late than never."

Andy Chen
Technical Director, Centropolis Effects.

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Maya

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