

Mortal Skin: Leviathan 0.9 Post-Mortem and Shot Breakdown by Dave Mansfield

Hello. If you're reading this then you probably know more than the average Space Monkey, and I salute you. Pour a cup of coffee, get comfy and allow me to share with you the process that made this 4 minute film possible. This animation was created in 110 days (including two weeks spent camping in the Oregon Siskiyou Mountains) on two 1.6 GHz computers using *Max 8.0*, *AfterFX 5.0* and 35,587 cups of coffee (adjusted for gross over exaggeration).

In 2001 the partnership of several unlikely friends, Dustin Sweet, Oscar De los Reyes, Bryan Mayner, Barry Bankhead and yours truly, at the Art Institute of Colorado produced a primitive but promising two minute animation for their graduation reels about a giant killer cyborg who just quit his job and is now on the run from The Company. Over the next several years we drifted to different corners of the country, but always remained in touch and collaborate often. Now, several years on, I have finished screenplays for an entire 13 episode season with a solid map of the next 2-4 seasons, outlines for two movies, designs for three games and outlines for a dozen graphic novels, but all I had to show of this immense, complete universe was a rinky-dink animation. It became apparent that the time was ripe to change that.

I began working on this animation, *Mortal Skin: Leviathan 0.9*, in May 2007. I had several existing assets to start with, i.e. The Diner virtual set scaled to the proper size, the original city file unscaled, a recently rigged Nathan character (Character Studio skeleton with 26 head morph targets), the waitress (Character Studio skeleton only), the Special High Intensity Tactical commando (Character Studio skeleton only) and a partially finished SIN character.

First, I threw away the timing from the original. Creating an animatic (animated storyboard) of the diner sequence in *AfterFX* using still frames from the original animation and scooting the individually recorded lines of dialogue around, I created an energy that wasn't there before. Moving the audio over into Sonic Foundry's *ACID Pro*, I then rebuilt the entire audio bed for the animation divided into three scenes: The Gunship, The City (music) and The Diner. At the same time I was recording my own voice for all of the other parts that didn't exist. I managed to talk several friends into lending their voices much later in the production with a minimum of re-animation.

On the original animation the brilliant Oscar De los Reyes and I collaborated on the audio design, something that I personally have over 20 years experience with as one of the founding members of the industrial band *Society.Burning* (myspace.com/societyburning). I cherry picked the best sounds we created (for example, SIN's breaking arm is actually a carrot and a stalk of celery being snapped in front of a microphone) and created the master timing sheet as I worked. For the music I used two excerpts of songs by my long-time music collaborator, the genius Boom Chr Paige, and used the title track from our previously unreleased 1994 album, *State.of.Decay*, to kick things off. (In stores by Christmas 2007)

Since I was using two older machines of limited capacity, I knew that this animation would have to be rendered into layers with both transparency (alpha) channels and Depth of Field (Z) channels, then composite everything together later. This also provided me with a wide variety of short cuts I could use to increase my production tremendously, such as looped animations and held frames.

I alternated between using the *Mental Ray* render engine and the good old *Default Scan Line* render engine because they both had their own strengths and weaknesses. *Mental Ray* is a powerful industry standard, but would sometimes take up to two hours to render one frame when features like Motion Blur and Caustics are enabled. And at 30 frames a second, 7200 frames total for four minutes, that is a crippling blow to production when you only have two 1.6GHz machines. So I used it to it's fullest only when I really needed the hero shots to shine. The *Default Scan Line* renderer, with Motion Blur enabled, could generate comparable shots in 5-10 seconds, which is obviously the superior production route for a solitary artist. And if it wasn't for the fact that certain key materials (Shaders) could not be handled by the *Default Scan Line*, like for example complex skin sub-surface shading, I would have used it entirely.

Working an average of 12 hours a day, not including time spent foraging for food, more coffee or going to SIGGRAPH '07, I kept one machine rendering at all times and enslaving the second machine as a render box when sleep overcame me. As layers were completed, I composited all of the assets in *Adobe's AfterFX 5*. I use *AfterFX* for two reasons, it's a simple, reliable workhorse and I have dozens of registered plug-ins that will work no where else. But in working this way, I was able to quickly discover which camera movements and angles worked and which didn't and made corrections literally on the fly.

Unless otherwise noted, all of the following tasks were completed solely by me: Character Design in *Poser 7* and *3DS Max 8*, Character Texturing, Character Rigging and Preparation, Character Animation (both body and facial), Lighting, Material (Shader) fine tuning, Environmental Animation (Smoke, haze, engine exhausts, gun blasts, smog, volumetric lights, etc), Camera Placement and Animation (Cinematography), File Exporting and Conversions, Sound Design, Audio Mix Down and 2D Compositing of the final shots. I also created and textured several 3D models though out the entire animation and will point out my additions.

And so now, without further ado, here's a shot-by-shot breakdown of Mortal Skin: Leviathan 0.9.

Scene 01 – The Hornet Gunship INT:

Shot 01: 724 Frames. All animation by me. Introducing clones BG-37 and BK-58 of the Special High Intensity Tactical Squad, or SHIT Squad for short, my Rosencrantz and Guildenstern of this little tale. I wanted to create a "hand held" camera motion for this sequence to imply the feeling that these characters are on a moving vehicle, yet maintain a mixed sense of claustrophobia and boredom. I linked the camera's target focal points to a Dummy (null object) that was driven by a random noise modifier, which promptly shook the camera like a drunken sailor. Then for each of the different shots I would change the random number seed and have a whole new set of camera movements that could be infinitely repeated for rendering multiple passes of the foreground and background elements.

The Gunship's steering yoke was animated in a similar manner with the added axis of the twisting wheel. I then linked the pilot's hands to the wheel, enabled inverse kinematics and presto, one minute and fourteen seconds of unique, unrepeated character animation created with one simple rig.

The Gunship's interior and exterior were modeled exclusively for this animation by the extremely talented Barry Bankhead, while I modeled the schizophrenic set decorations (Instrument dials, switches, monitors and the mock boiler plating.) Note that the TV over the pilot's shoulder is showing the same thing as the TVs in the city and Diner.

Shot 02: 108 Frames. This is the start of where Dustin Sweet lent his phenomenal animation skills with the animated jawbone he suggested I set up. Body animation by me.

Shot 03: 212 Frames. Background character body animation by me, foreground body and jawbone by Dustin Sweet.

Shot 04: 150 Frames. Character body and jawbone by Dustin Sweet.

Shot 05: 114 Frames. Character body animation by me, jawbone by Dustin Sweet.

Shot 06: 29 Frames. Character body and jawbone by Dustin Sweet.

Shot 07: 30 Frames. Character body animation by me, jawbone by Dustin Sweet.

Shot 08: 200 Frames. Foreground body animation by me, background body and jawbone by Dustin Sweet.

Shot 09: 236 Frames. The introduction of ARTEMIS. All animation by me. As I was creating this scene later on in the production, I already had a perfectly rigged body in a business suit, Agent Rock, who appears later in the Diner Sequence, so I didn't need to re-invent the wheel. I created a unique head in Poser 7's face room, exported 24 heads with morph targets (broken into facial zones for eyebrows, eyes, mouth, and also general emotions like angry or disgusted), rigged the head onto the existing body and was animating in less than a day. Over all it took two days to create the nine seconds of lip-synched animation, and almost twice as long to render his layers in *Mental Ray* to take advantage of the sub-surface scattering skin material I custom made.

Originally in the storyboards I wanted to do his scene with a wide shot only, but I felt it completely interrupted the flow I had established by going to a nine second wide shot then a one second close-up then back to wide for another eleven seconds. So I took full advantage of my digital performers and broke the entire sequence up into four different angles that I could cut between to keep the comic rhythm going.

Shot 10: 82 Frames. All animation by me.

Shot 11: 280 Frames. All animation by me. Up until this point all animation was keyframed, but for Artemis' I used a slightly modified (by me) mo-cap of a person on their cell phone to give the shot a little more "life" in a short amount of time.

Scene 02 – The City EXT:

Shot 12: 770 Frames. All animation by me. Following 3D models by me: The base landscape, "Big Betty" on top of the Hash House, train tracks and tunnels, walls, satellite dishes, TV antennas, air-conditioners, telephone poles and 130 simple buildings using a pool of 7 textures. This 26 second sequence was rendered in 32 different layers and took almost two weeks to render using the *Default Scan Line* renderer. Since I was creating this shot near the end of production, I was locked into the look of the city on the far side of the tracks. This influenced the lighting and design of the rest of the city, which required over 600 Omni-directional lights. The sound design makes the city feel much more frenetic and dangerous. Using the popular "Dystopia" sci-fi city mesh series by the brilliant Moebius87 as a base, I was able to fill the 16 square miles of set required for this shot. The Fresno Trains, the Diner exterior and "hero" buildings by Bryan Mayner.

Scene 03 – The Diner INT:

Shot 13: 87 Frames. Now we re-enter familiar territory for anyone who saw the original 2001 animation. The Diner was built by the talented Bryan Mayner, who had spent roughly four months modeling and texturing like a madman. Lighting by me. Using Dustin Sweet's original camera angles as the base inspiration, I quickly had the shots blocked and began feeding my network render node shots of the diner layer, an ambient haze layer, the lamp glow and city background layers.

Using what is called a Matte/Shadow Material, I could use the original geometry to mask out areas hiding characters as well as their cast shadows, or, show the shadows on an invisible surface for compositing, in this case an empty diner. The two diner patrons sitting at the back booth were keyframe animated while SIN's animation was a combination of mo-cap and keyframe animations.

Shot 14: 120 Frames. My CAMEO! Most people give themselves much sexier bodies in the virtual realms so I thought it might be funny to instead pack on a few pounds, not quite an Alfred Hitchcock gut, but just enough. Back in 2002 at the Game Developer Conference (way back when they were still fun) I waited in line for an hour and a half to get my face digitally scanned by a product vendor. It was worth the wait. Later that summer I had "stitched" my digital face onto a generic Poser head and forgot about it. While I was prepping the Cook's model for this shot I stumbled across it and went with the flow.

Due to a corruption in my archive, I was forced to start with an earlier unfinished kitchen mesh by Bryan Mayner. I completed the texturing on the stoves and sink, then added the cardboard boxes using textures I had taken myself for another gig. I then added some volumetric fog and a particle system for steam and smoke.

Shot 15: 89 Frames. A tribute to Mr. Tararu. All textures, shaders and modeling of the laced back, bullets and holster by me. At this point I would like to mention that the base of SIN's outfit, as well as shoulder pads of the SHIT Squad suits, were created by my pal and former Poser enthusiast, Mr. Tararu. In 2004 when his cancer stopped responding to the chemotherapy he committed ritual suicide (he lived in Japan where that is not uncommon). We miss you, bro.

SIN was animated with a modified motion capture file from House of Moves. The male background diner patron has animated using motion capture on his upper body with keyframe animation for the lower as he shifts his weight around. SIN's holster movement is also keyframed.

Shot 16: 121 Frames. This is the first shot using Max's internal hair system for the waitress, Blanch, which proved to be a technical nightmare for me as I was only working with 1 GB of RAM (on each machine) and it had a nasty habit of hard crashing my systems every 59th frame. I ended up having to render the hair separately and use a Matte/Shadow material on the head.

But I also saw this as a complete validation of using geometry hair in legitimate productions, such as SIN's by the generous Mr. Kozaburo. I also added a flex modifier to SIN's front bangs so they would sway when she moves her head. Watch for it.

Shot 17: 63 Frames. All diner ware models (Cup, pie tray, napkins, etc) and animation by me. The waitress' appearance in this scene was actually a render test I had created early on in the production. Since it had taken over six hours to render I wanted to find a way to put that wasted time back into use. I animated her position

and scale in *AfterFX*, giving her belly just a little squash and stretch. I simulated a depth of field channel by applying greater and greater amounts of image blur to each layer that was further from the camera.

Shot 18: 64 Frames. All animation by me. To give my characters more “lifelike” eyes, I attached a noise-driven Dummy to the focal points of both character’s eyes causing them to jitter very slightly. This becomes extremely evident with Nathan’s laser. The laser is actually geometry with an animated texture (AVI) playing on it. Then, during compositing, I would control it’s visibility with the a brightness of the atmospheric layers, creating the look of a laser projected through puffs of smoke. Lastly, I added a tiny Directional Light inside the assembly so it would cast a bright red dot on any geometry it would happen to project on.

Shot 19: 76 Frames. All animation by me. For SIN I created over thirty two morph targets (expressions) to get a more subtle performance. I created several targets for each of the different facial zones; eyebrows, eyes, mouth, and phenomes (A, E, I, etc) as well as the full gamut of emotions (anger, happiness, fear, etc). I would start each facial animation with the lip-synch (talking) as this required keyframes nearly every other frame. Once that aspect of the animation was completed, I could then animate another pass to add emotions, nervous ticks and eye blinks because looking human doesn’t necessarily mean being photo-real.

Shot 20: 44 Frames. All animation by me. The glow of the overhead lamps are actually a trick I picked up from my old video game days. Using a flat plane that faces the camera at all times, I applied a texture map of the light-fall off and rendered a pass. Then during the compositing stage I could control exactly the brightness and fall off. Then I added an image glow filter to the layer to complete the illusion.

Shot 21: 43 Frames. All animation by me.

Shot 22: 49 Frames. All animation by me.

Shot 23: 88 Frames. All animation by me. I also attached a distance-attenuated spot light to the front of the train, a trick I used in the city shot, to light up the power lines in the distance and help draw attention to the train’s presence.

Shot 24: 78 Frames. All animation by me.

Shot 25: 64 Frames. All animation by me. SIN’s laser was created in the same manner as Nathan’s, only in blue.

Shot 26: 126 Frames. Agent Rock’s character animation by Oscar De los Reyes, all other animation by me. This is one of Dustin’s original camera moves that I just had to use but expanded on. When I composited the whole shot together, using a combination of scaling the images and pixel blur, I was able to simulate the fashionable “bad camera move” of over-pulling the lens focus and correcting.

Shot 27: 150 Frames. All animation by me. Because this shot was from Agent Rock’s POV (point of view) I added several 2D elements such as names and outlines to imply today’s current MMORG (massive multi-player on-line role-playing games) craze. The X-ray pop-up is actually a QTVR (Quicktime virtual reality) file loaded into *AfterFX*, which then laid out all of the frames end to end.

Shot 28: 192 Frames. All internal organs, cybernetics and 3D animation by me. 2D animation by Dustin Sweet and Oscar De los Reyes. This is one of three sequences from the original 2001 animation that I kept because they held up to the test of time and I hated to get rid of all the work my boys added to it. The X-Ray models of SIN and Nathan took me the better part of a quarter to build, set up and rig, ultimately earning me an A in three classes. If you look closely, you can actually see SIN's heart beating.

Shot 29: 132 Frames. All animation by me.

Shot 30: 56 Frames. All animation by me.

Shot 31: 45 Frames. All animation by me. Nathan's thumb blade is actually an extruded and beveled spline shape.

Shot 32: 110 Frames. All animation by me.

Shot 33: 30 Frames. All animation by me.

Shot 34: 94 Frames. All animation by me.

Shot 35: 112 Frames. All animation by me. Only the waitress is animated using motion capture. I also didn't use any depth of field on this shot to make it "pop" a little more since it's supposed to be from the POV of a cyborg (SIN).

Shot 36: 20 Frames. All internal organs, cybernetics and 3D animation by me, showing a nice detail of Nathan's arm gun.

Shot 37: 23 Frames. All animation by me. The camera jog when Nathan crushes SIN's arm was done during the compositing stage.

Shot 38: 132 Frames. Camera by Dustin Sweet, everything else by me. This shot required almost as many layers as the city sequence (28). Because the new Nathan model was much larger than the original I had to render the first four seconds of Nathan's hand only, then continue with the full character in view. I was also turning on and off layers in front and behind of each other as the shot progressed to create a seamless 270 degree pan.

Shot 40: 52 Frames. All animation by me. SIN's skull is actually from the Visible Human Project, that dead guy from Texas they sliced away millimeter by millimeter and scanned into a computer to make the most accurate digital map of the human body in the early 21st century.

Shot 41: 92 Frames. Agent Rock, Customer #1 and Customer #2's character animation by Oscar De los Reyes, all other animation by me. To shake the camera for the gunshots, I composited this scene in two parts, Agent Rock and the surrounding environment and Nathan with his various effects, namely his laser eye and the ejected gun shells which was actually a particle system instancing it's geometry from a single shell mesh. Then in a third composition I set the two layers at different distances from *AfterFX*'s scene camera, which I then animated by rotating slightly with each gunshot and then let it "drift" until the next blast.

Shot 42: 30 Frames. All animation by me. This is also the first of three shots using Max's native cloth system for the lower half of Nathan's overcoat.

Shot 43: 118 Frames. All animation by me. This is actually the last shot I had completed during this production and proved to be one of the most demanding, as it employed every technique previously used plus the addition of several more. The shattering window was done by using a Mesh Bomb to blast apart a high-polygon window where Nathan's shoulder connects, then used a Wind and a Gravity Space-Warp (*Max 8's* particle system physics) to move the shards where I wanted them. This is also the first shot to use a light with an atmospheric fog effect.

Shot 44: 150 Frames. All animation by me. Computer targeting system icon by the incredible Annie Fodge.

Shot 45: 349 Frames. All animation by me. Birthing Tank set by me. This is actually the first shot I had completed during this production. Because I was using the *Mental Ray* render engine at its full capacity, with both computers rendering full-time it still took three days to create the 12 seconds on screen. The rippling water effect of the lights was created by applying a Cell-Noise Procedural Map (a mathematically generated texture map) as a Cookie (a stage-term for patterns placed on lights to cast shadows) which was then animated to move sideways. Since the texture was computer-generated, it was infinitely long and never repeated itself.

The bubbles were created by rendering a particle system disturbed by a Wind Space warp with a shiny translucent material applied. I then took the same animation and added it in five more times, adjusting the scale and start times for each, then added various amounts of Image Blur to give the illusion of them passing in and out of the focal range of the camera.

That's all folks...

This concludes my Post-Mortem of *Mortal Skin: Leviathan 0.9*. I hope you found this analysis enlightening and possibly even educational. May you enjoy watching the animation as much as I enjoyed making it. Cheers!

-Dave Mansfield, 2007