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The LEGO Batman Movie Page 22

“We added fingerprints to certain models. We can do that at a brick level, so that those fingerprints could be propagated”

Damien Gray,
Animal Logic





Epic Games' Robo Recall
Page 38

Welcome



Look close enough – and I mean really look – and you'll see fingerprints all over *The LEGO Batman Movie*. Not figurative fingerprints, real ones, placed there by lead vendor Animal Logic to heighten the sense of realism and tangibility in the film. We aren't watching animated digital characters, we're watching animated digital versions of plastic characters. This is, of course, reflected in Animal Logic's incredible attention to detail – fingerprints aside, individual bricks throughout the *LEGO Batman* world are scuffed, dented and damaged enough to look played with.

This month we've been lucky enough to go behind the scenes at Animal Logic to learn all about the team's artistic approach to filmmaking, the proprietary technology driving innovation and how crucial interesting and accomplished cinematography is in building an animated picture.

Naturally, the fun doesn't stop there. Elsewhere in the issue we've got a print exclusive look at Gleb Alexandrov and Aidy Burrows' Space VFX Elements masterclass for Blender, expert users reveal the 14 advanced skills you need to master in ZBrush and Epic Games chats to us about the upcoming *Robo Recall*, all topped off by a bumper tutorial section. Enjoy!

Steve Holmes, Editor

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The Expert Panel

This issue's team of pro artists...



ANIMAL LOGIC
animallogic.com



Dive headfirst into our incredible cover feature on p22, as the talented team at Animal Logic takes us behind the scenes of *The LEGO Batman Movie*, revealing some incredible stats in the process.
3DArtist username n/a



AIDY BURROWS & GLEB ALEXANDROV
creativeshrimp.com/spacevfx.html



Two veritable Blender geniuses combine to walk you through creating astonishing planets and galaxies over on p32. Learn to model and texture planets, create close-ups and go procedural.
3DArtist username n/a



PABLO MUÑOZ GÓMEZ
zbrushguides.com/work



Pablo returns to 3D Artist with another spectacular sculpt this month, this time featuring a stripped back ZBrush-to-Photoshop workflow that shows off his admirable hair and fur skills.
3DArtist username pablander



CLINTON CRUMPLER
clintoncrumpler.com



Clinton creates some really fascinating Unreal Engine environments in his spare time (while he's not working on games like *Gears Of War 4*). Jump to p58 to find out how he does it.
3DArtist username ccrumpler



MIDGE SINNAEVE
themantissa.net



Correctly compositing an image using render passes is a really valuable skill. Over on p66, Midge is on hand to show you how to do this properly in Blender's Cycles renderer and After Effects.
3DArtist username Mantissa



LEONARDO IEZZI
leonano.com



A veteran of Sony London Studio and Ubisoft Reflections, Leonardo is a brilliant games artist. Head over to p74 to learn how to save time while texturing your game assets in Substance Painter.
3DArtist username leonano



RAINER DUDA
rd-innovations.de



Versatile technical artist Rainer has branched out from Houdini and Clarisse to talk a little bit about KATANA this month. Check out his intro to lighting, look dev and materials on p78.
3DArtist username Rainerd



PAUL CHAMPION
linkedin.com/in/pchampion



Over on p84, VFX trainer and demonstrator Paul has put version 5.4 of HDR Light Studio through its paces. New features include 32 new Light Sources and more.
3DArtist username Rocker



ORESTIS BASTOUNIS
twitter.com/mrbastounis



Escape Technology very kindly provided Orestis with an HP workstation to test the new NVIDIA Quadro P5000, part of the new line of Pascal GPUs. You'll find his review over on p82.
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How Peter Ang utilised a Corona light rectangle and fill light to create this mouthwatering food render

“Part of the brief on LEGO Batman was to make it seem like it was filmed with real miniature brick sets”

Craig Welsh from Animal Logic reveals all **Page 22**

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Composite Cycles render passes in After Effects

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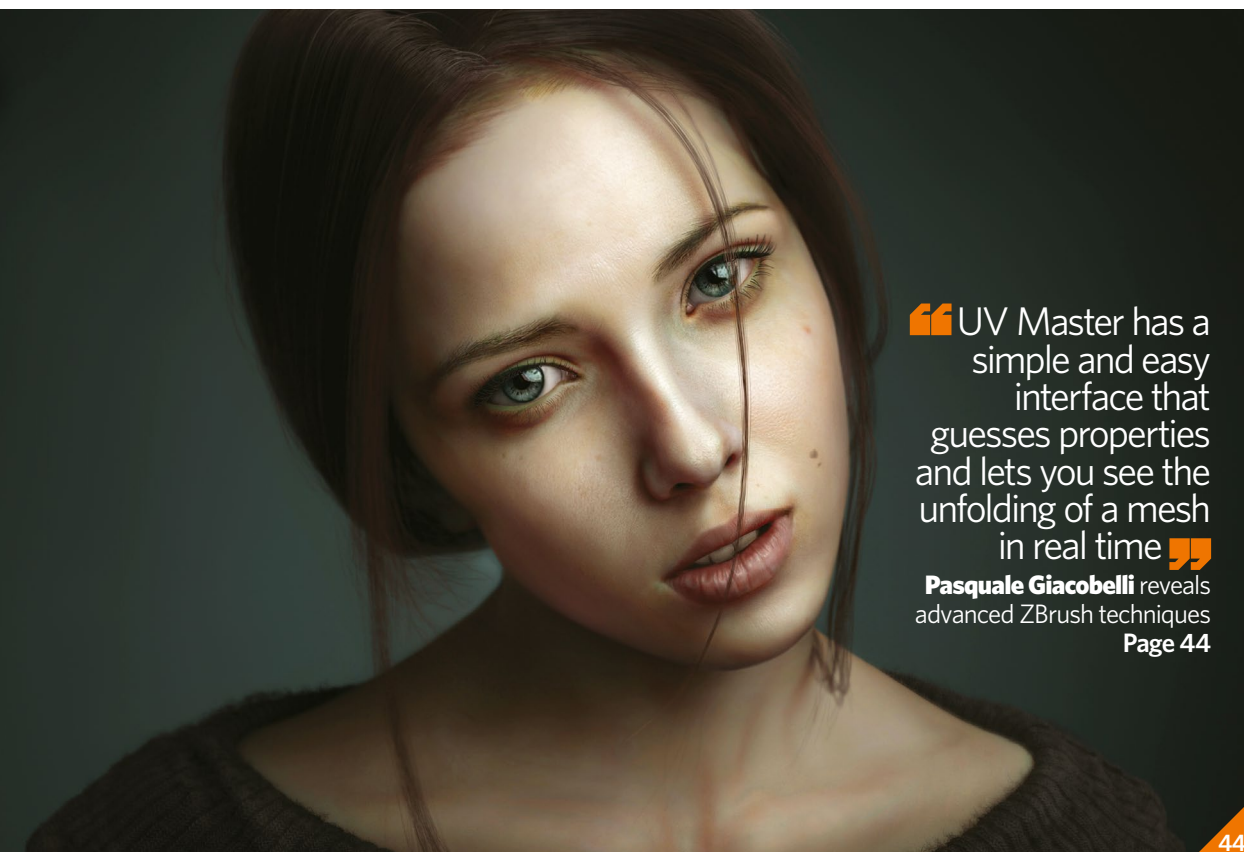




Master hair & fur
in ZBrush 50



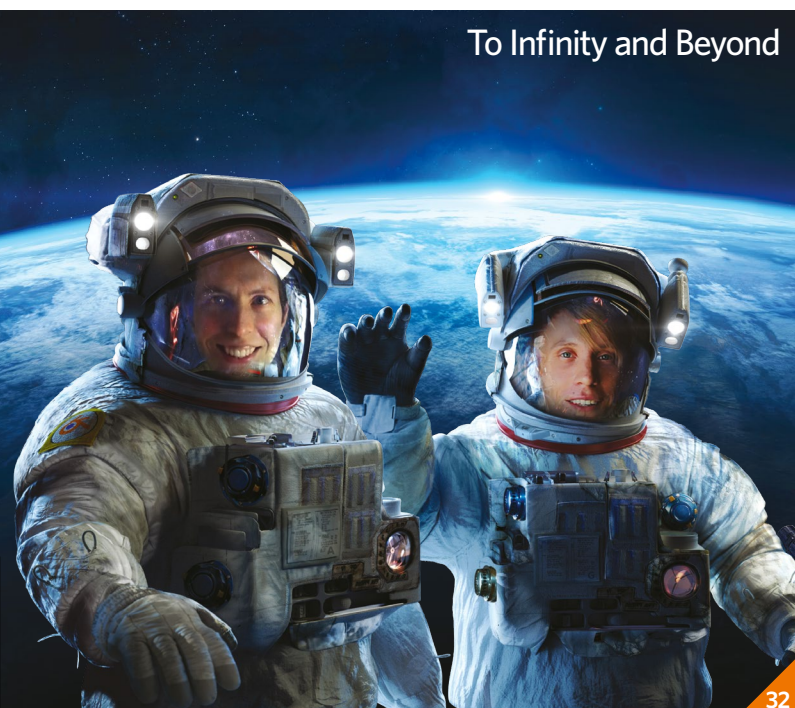
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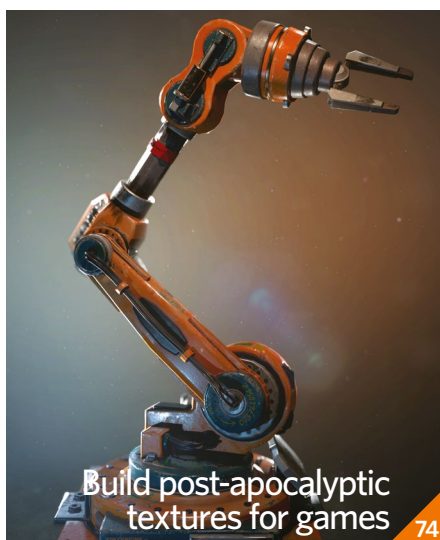
UV Master has a simple and easy interface that guesses properties and lets you see the unfolding of a mesh in real time

Pasquale Giacobelli reveals advanced ZBrush techniques
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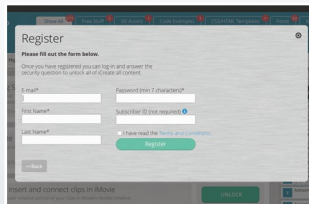


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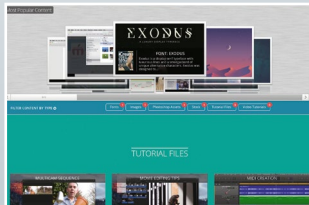
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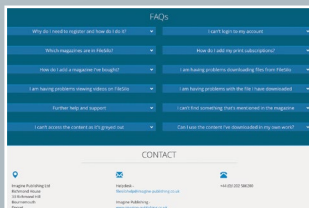
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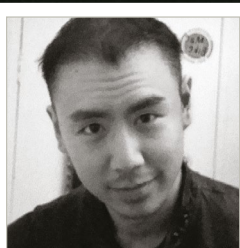
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“I wanted to do an arch-vis image that had a cinematic feel, so I decided to place a subtle silhouette of the main character (building) behind a foggy street. The road textures were painted non-procedurally to control car light reflections on the puddles. Water droplets on the window were made with a simple displacement map”

Wai Kin Lam,
Melancholy Sanctuary IV, 2016



Wai Kin Lam
www.makonimation.com

Wai Kin is an arch-vis artist who is now part of the Foster + Partners visualisation team

Software 3ds Max, V-Ray, NUKE, Photoshop

Work in progress...







“I created this image while I was attending Gnomon. Early on I decided that I wanted a reel that catered towards hard-surface modelling. I came across Konstantin Maystrenko’s concept of a military robot on Artstation. The solid design convinced me that I had to model it for my demo reel.”

Akin Adekile,
Elite Unit, 2016



Akin Adekile
akin_adekile.artstation.com

Akin is a 3D modeller and texture artist currently working in the film industry

Software Maya, ZBrush, Substance Painter, V-Ray

Work in progress...





Jesús F Calderón
www.jesusc.net

Jesus is a multidisciplinary artist, mostly focused on grooming and environments

Software Maya, Quixel
Megascans, Redshift

Work in progress...



“This little project was borne from a little mouse that I bought one year ago for my two-year-old son – it is a toy that came with a book and the mouse’s name is Timoteo. He loved it for months, and now each time my son sees a mouse he calls it that”

Jesús Fernández Calderón,
Timothy the Autumn Mouse, 2017

“This project was realised in a day with a picture reference. My main objective during this production was simply practicing to understand parameters of the new RenderMan 21 shader, but also to create realistic props in a short time”

Agathe Girard,
Cup of Tea, 2016

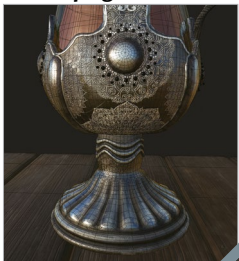


Agathe Girard
www.agathe-girard.com

Agathe is a 3D artist currently earning a BA in 3D Conception & VFX at Aries school in France

Software Maya, ZBrush, Substance Painter, RenderMan

Work in progress...





Zacharias Reinhardt
zachariasreinhardt.com

Zacharias is a freelance 3D
artist and a Blender
Foundation Certified Trainer

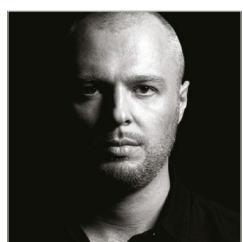
Software Blender,
Photoshop

Work in progress...



“I created this rendering during
SculptJanuary 2017. The topic was
‘Turtle’. I found this great artwork by
Sergey Vasnev and thought I give it a
try. It was fully sculpted inside
Blender, I only used procedural
textures for the materials and
rendered it in Cycles”

Zacharias Reinhardt,
Turtle, 2017

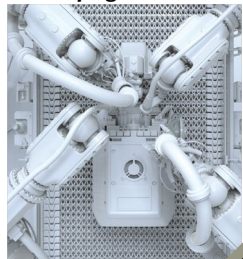


Max Emski
maxemski.com

Initially working in engineering, Max now works in the videogames industry

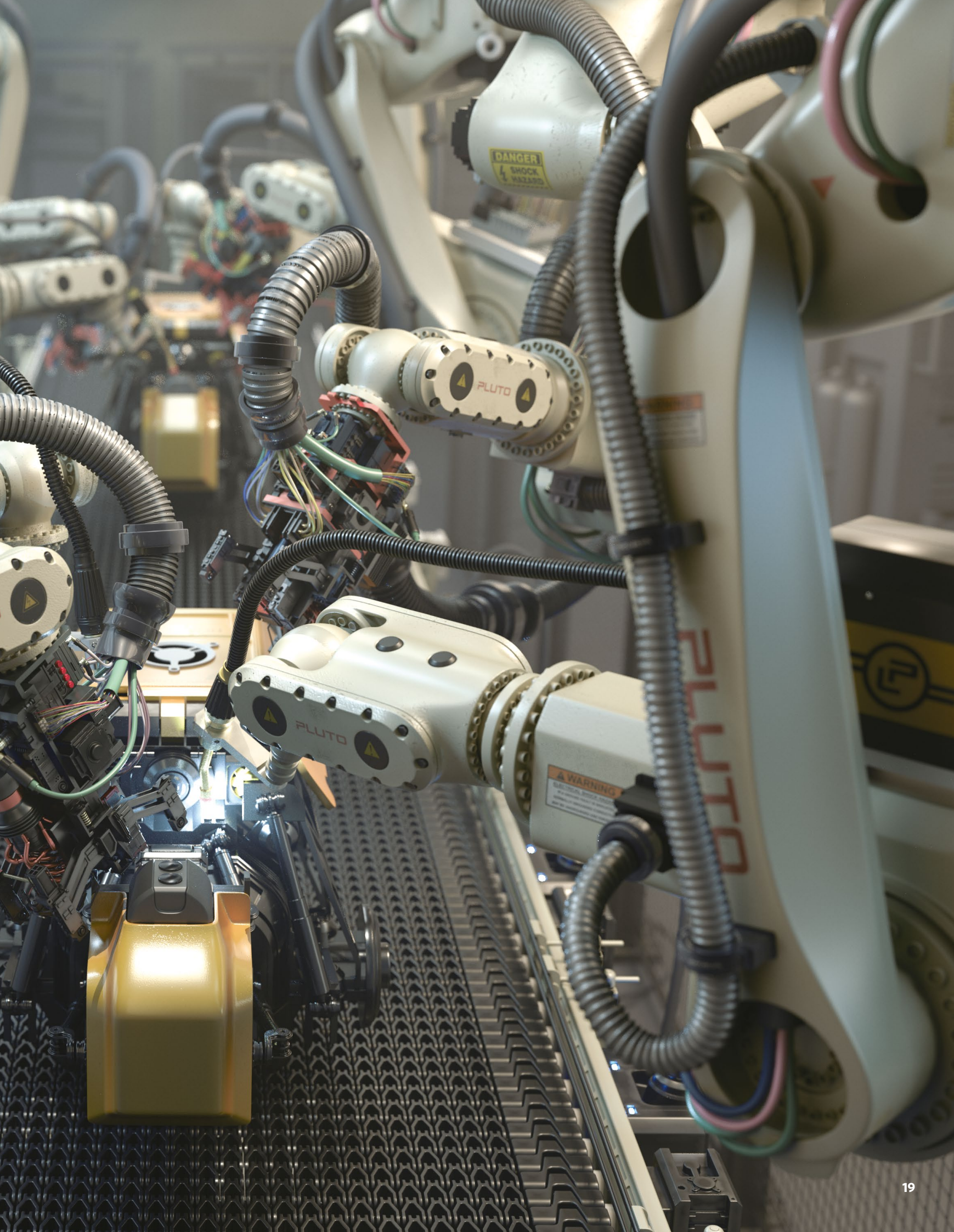
Software Maya, Arnold
Renderer

Work in progress...



“When I made the scene I was trying to imagine how a manufacturer of droids might look. I wanted to create something close to reality. I really like Kuka’s robotic arm design, so I decided to put it into my scene”

Max Emski,
Robotic Arms, 2016

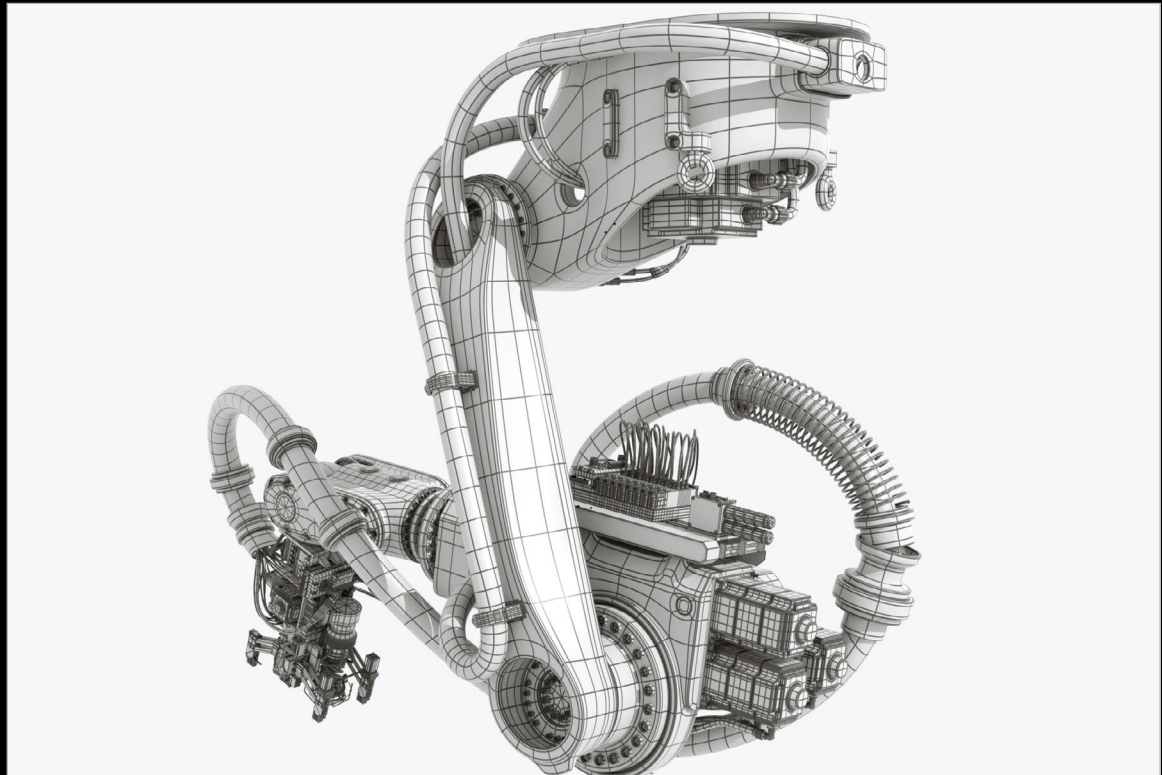


“When I created one of them I decided to rotate it 180 degrees. I liked how it looked and this idea inspired me to make the full scene, where some robots were manufacturing others”

Max Emski,
Robotic Arms, 2016

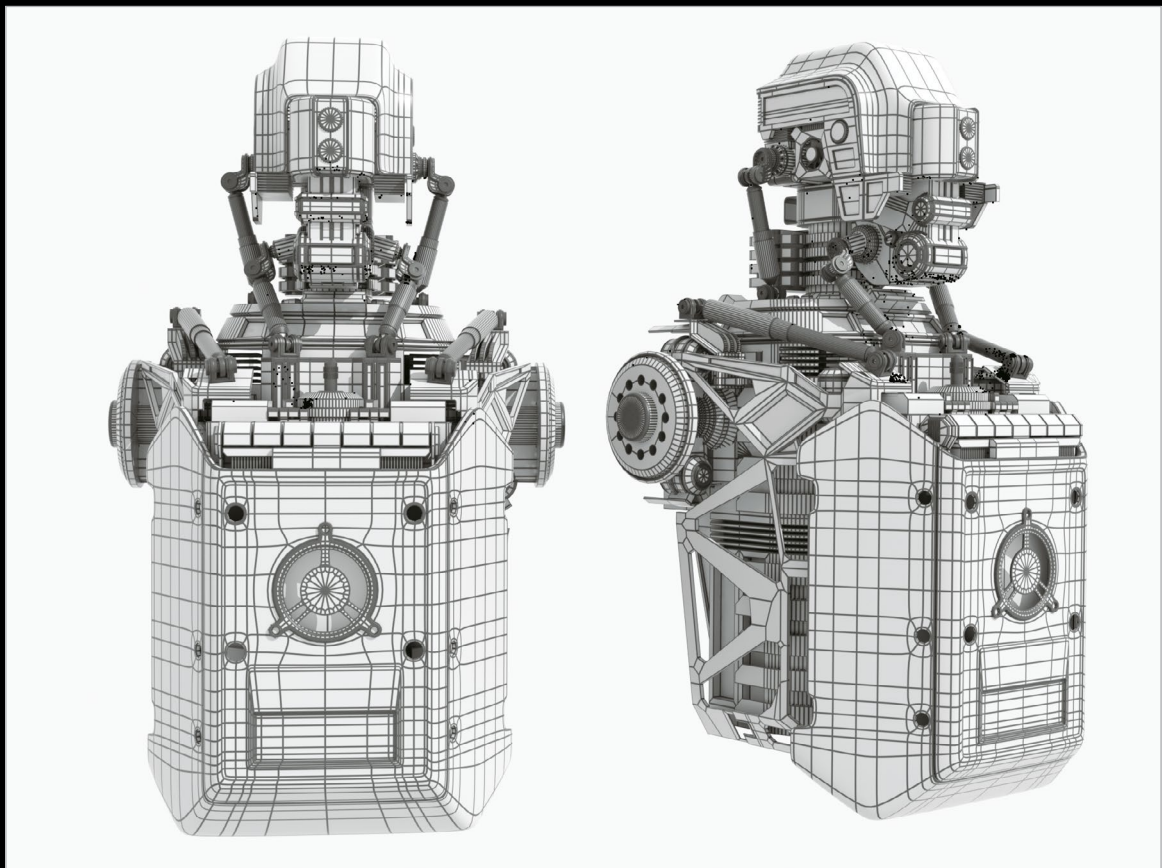
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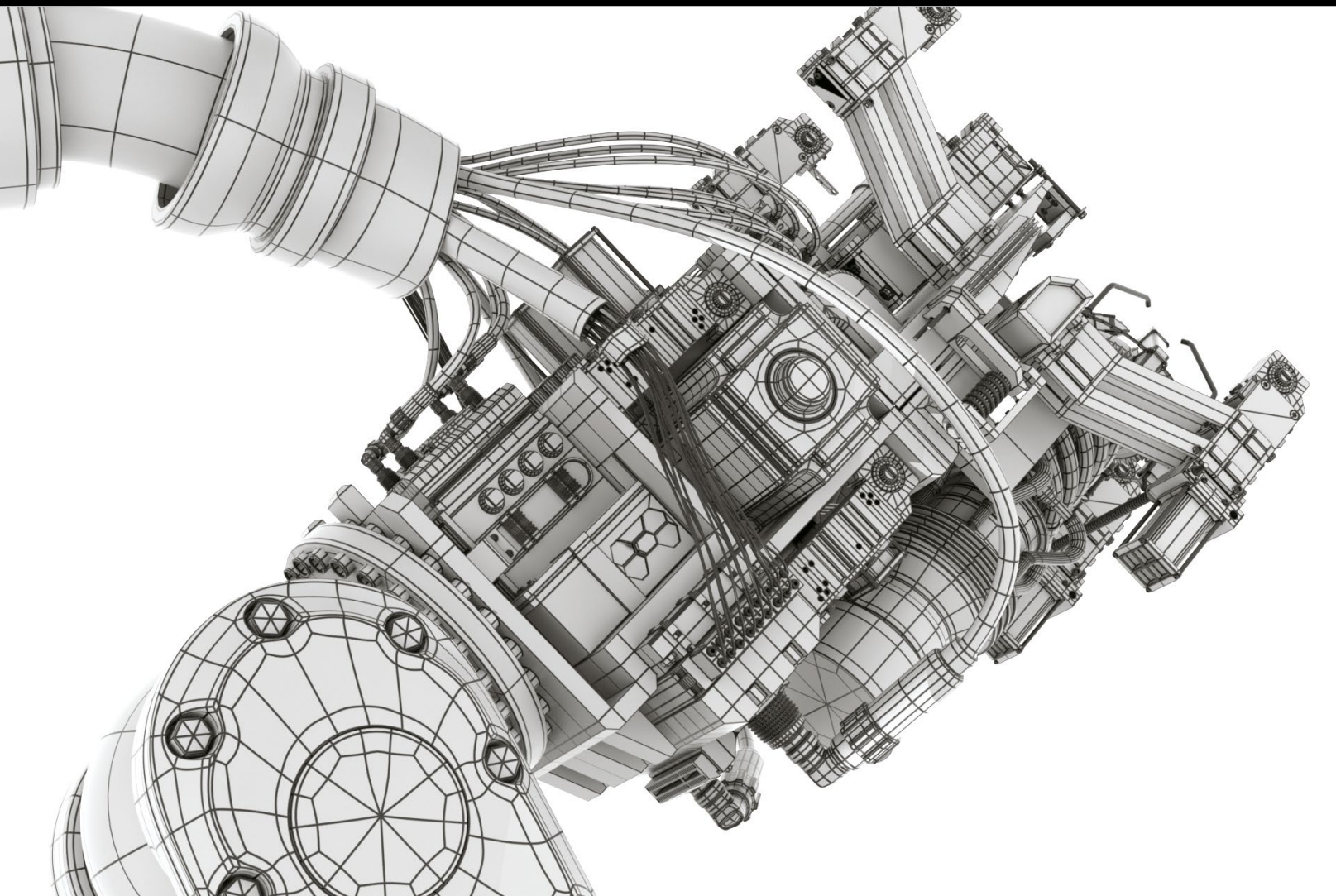
RIGHT The first part of my process was designing the main part of the arm. At this stage I used subdivision surface modelling. I think that good wireframing is important for a shape like this.



FURTHER DETAILS

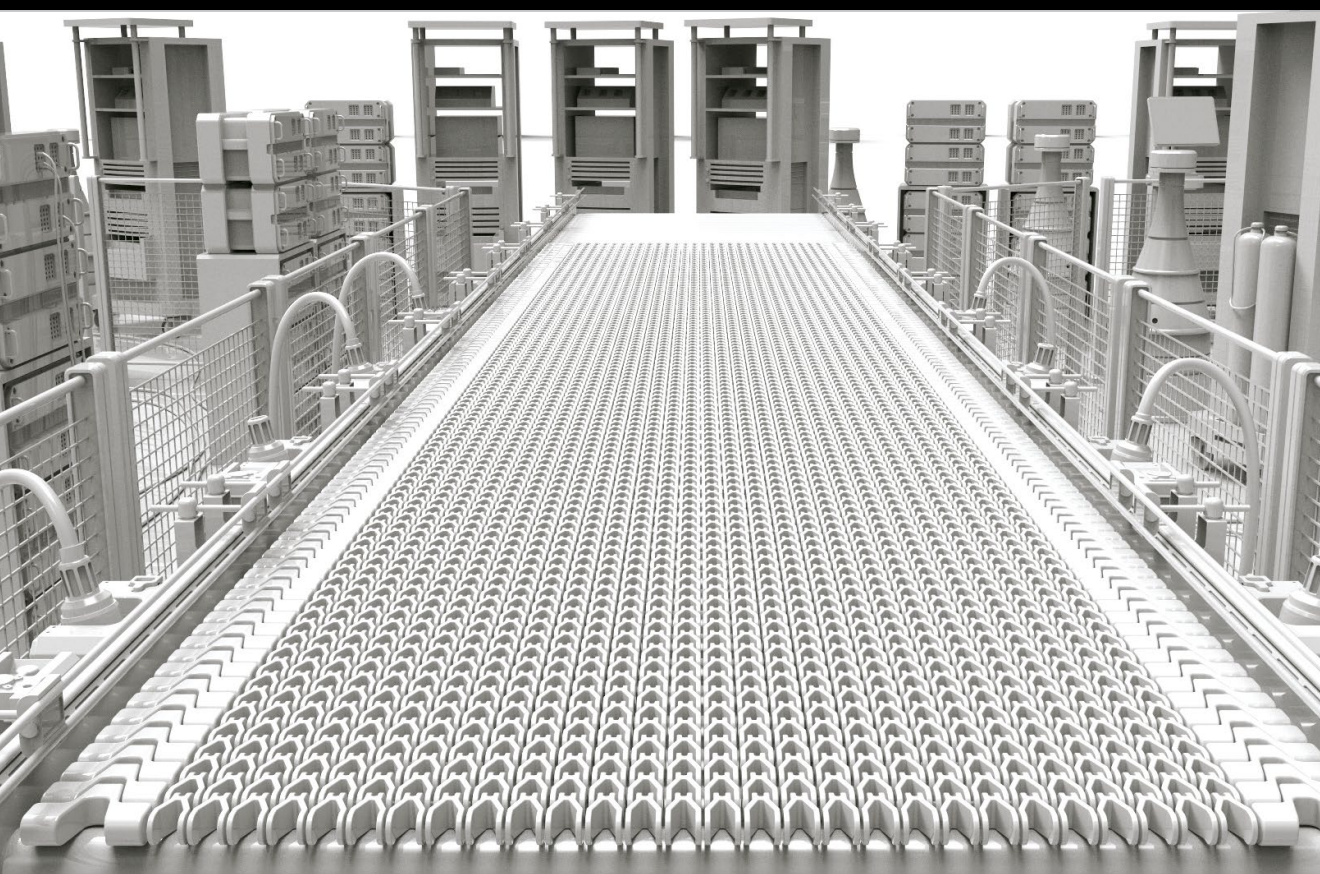
RIGHT In the second stage I created a more detailed droid inspired by the film *Elysium*. I didn't model anything that you can't see in the scene.





SURFACE DETAILS

ABOVE For the third stage I made pipes, wires and more, and duplicated all the meshes to add to the scene's complexity. For pipes I used Displacement maps for adding surface detail. For smaller details I didn't use any subdivision.



ADDING TO THE SCENE

LEFT During the final stage I made a simple environment, along with props and a conveyor. That conveyor is central to the scene, so I put a lot of focus on it.

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A LEGO Batgirl minifigure in a purple suit with a yellow bat emblem and a yellow cape, holding a yellow baton. In the top left corner, a white LEGO brick with three studs is shown.

HEROES OF ANIMATION

A LEGO Robin minifigure with brown hair, green eyes, and a red suit with a yellow cape, holding a green object.

Key Animal Logic CG and design crew members reveal the pro VFX secrets behind *The LEGO Batman Movie*

When Animal Logic completed work on *The LEGO Batman Movie*, the latest instalment in its animated LEGO adventures, its artists worked out that the entire film would take 57,418,857 hours to render, albeit on a single CPU. Of course, the animation studio, which now has offices in both Sydney and Vancouver, relies on an advanced render farm to complete its 3D animated features and visual effects work.

And for *The LEGO Batman Movie*, that work was incredibly complex. A crew nearing 500 people laboured over 451 CG characters in the film, along with multiple vehicles, buildings and environments, each effectively made up collections of individual LEGO-approved bricks.

Gotham City, for example, consisted of 220,831,071 bricks (in real LEGO brick terms, the city would cover 379,095 square feet or 6.6 football fields in area).

Indeed, since *The LEGO Movie* was released in 2014, Animal Logic has ramped up both its creative and technical prowess to become a major player in animated features, while also keeping a hand in visual effects.

To find out just what technical advancements Animal Logic has made in its animation and VFX pipeline, and how it brought a whole new level of artistry to *The LEGO Batman Movie*, 3D Artist sat down with key members of design, CG and lighting teams to discuss the making of the film, brick by brick.

DESIGN FOR THE DARKNESS

The LEGO Movie, directed by Phil Lord and Christopher Miller, was a major hit, tapping into the much-loved stop-motion 'brick films'. To bring that style to life, Animal Logic had invested significantly in a style of animation, virtual cinematography and rendering technology that resulted in a completely believable photoreal look for the CG film.

It was something the studio continued to advance on *The LEGO Batman Movie*, directed by Chris McKay, who was the animation director on the original film. This time, however, Animal Logic had the opportunity to tap into much darker source material: Batman.

"We wanted to explore what makes Batman or Bruce Wayne (Will Arnett) so dark and brooding, and how is it that a man that essentially has everything, is famous, has super-fast cars, lives in a mansion, and can hang out with supermodels all day, why is he fundamentally unhappy," outlines production designer Grant Freckleton.

And so began many months of research into Batman-related material, from comic books to animated films and television shows, videogames and the various Batman feature films. The studio worked closely with several key stakeholders in the franchise, too, including Warner Bros. Pictures, Warner Animation Group, LEGO System A/S and DC Entertainment. The collaborations would be translated into almost countless collections of character, vehicle and environment designs, colour scripts and concepts by Animal Logic's design department.

The design process was even more expansive, perhaps, since *The LEGO Batman Movie* takes place in a much larger world than the first film. Freckleton actually looked to real LEGO reference for how that expansiveness would work in this film.

"If you go to LEGOLAND in San Diego or in Denmark they build these city structures that are amazingly detailed," he says. "When you step back or photograph them from far away they look like real cities. They look completely convincing. And we thought, well, why don't we try an experiment with this idea and rather than trying to make everything feel small and brickly, how big can we make stuff out of LEGO bricks? How much can we make this feel like a world of infinite scope and infinite possibilities? As an audience member, when you see Gotham City, you care about the city. It's not like a toy set, it's actually a real, living, breathing place."

To realise that detail, Freckleton oversaw a team working in mediums all the way from pen and paper to Photoshop and, more and more, in 3D modelling, even just for designs. "Even though we may do a drawn environment first," he says, "we'll also follow through in the art

Look closely at the Minifigure characters in the film and you'll soon spot wear and tear and other inconsistencies in the plastic that make them feel real, not digital



Batman's Bat Grapple Gun was the most used CG prop in the film, appearing 442 times



“We wanted to explore what makes Batman or Bruce Wayne so dark and brooding”

Grant Freckleton,
Production designer

department with nutting out the spatial relationships of the larger-scale sets. And that means artists will be working in Maya and also LEGO's own design tool and building models to use that way."

ART AND SCIENCE OF BRICKS

The enormous world of *The LEGO Batman Movie* revolves very much around a brick look and feel. This meant Animal Logic's pipeline had to handle some impressive brick building - in fact, a total of 3,180 bricks were part of Animal Logic's brick library, up from 2,000 on the first film. And, like the original, the studio started by modelling bricks in LEGO's freely available LEGO Digital Designer (LDD) tool. This meant the film assets would accurately reflect the toy company's official set of available bricks.

Out of the LEGO Digital Designer, Animal Logic took the LXS files and brought them into their own brick pipeline set of tools. "We've



Animal Logic's proprietary physically-based renderer, Glimpse, was improved upon for the film to deal with the plastic characters, vehicles and environments



217 different Bat models were made for the film

dubbed those tools a 'shell bake,'" explains CG supervisor, Damien Gray. "Here we basically take that LDD description and we feed that to a tool that would then retrieve the geometry from the actual brick database that we had built. We actually revisited a lot of our more common bricks and tweaked and scrutinised some of the topology and some of the roundness of creases and edges there."

The next stage involved the assembly of this data into a physical 3D model that could be loaded into Maya. Here, any redundant details in the model like internal components in the bricks are stripped away for better efficiency. A jitter algorithm also enabled the bricks to be slightly pulled apart and rotated so that they did not look too uniform. The result was small gaps just like you'd see in real LEGO creations.

Similarly, the textures of the bricks and final models themselves were crafted to reflect real plastic, right down to the little imperfections.

"We ended up generating 81,854 textures," notes Gray. "A lot of those are Decal maps, but there are Displacement maps and also Scratch maps and Dirt maps."

Even human fingerprints became part of the finest details on some of the models, as Gray explains. "We added fingerprints selectively to certain models. We can do that at a brick level, so that those fingerprints could be propagated, and then we'd also create multiple variations of fingerprints per brick so they could be procedurally spread across a model. We also selectively applied fingerprints on a model once it had been assembled."

What made Animal Logic's VFX and animation pipeline even more powerful was the development of a system that allowed artists to access individual bricks at any stage in the pipeline. This provided 'per-brick control', and gave the studio a flexible approach to manipulating models and textures.



MODELLING A SUPERHERO MINIFIG

The characters of *The LEGO Batman Movie* received some fresh upgrades for the film

Like they were in *The LEGO Movie*, minifigures (or minifigs) are the main characters in *The LEGO Batman Movie*. Batman, Batgirl, The Joker, Robin and scores of other characters fill the scenes, each modelled and animated by the team at Animal Logic. The studio took the opportunity to revisit its approach to the minifigs from the original film, starting with a reassessment of their dimensions.

"On the first film we pretty much modelled the minifig using photographs and our eyeballs... but this time we actually went out and did a 3D scan of a real minifig to get those proportions accurate," says CG supervisor Damien Gray.

From that, a few extra details were incorporated into the models of the minifigs, such as the way the torso slightly overhangs the hips when their legs and body are connected together.

In addition, LEGO moulds were made for the minifigs and often involved soft sculpts that could be re-worked for specific details, such as hair, and to achieve the right silhouette for the character.

Animal Logic's final minifig models represented the hours of work behind all aspects of the characters, from face shapes to colour and costume choices. A trademark of the studio's final minifig models, and all the models in the film, was the inclusion of real-life textures; things that impact on actual LEGO minifigs and bricks. "We generated something we termed 'grunge', which would actually put dirt and extra detail into the corners and the cracks and the crevices of our LEGO models," notes Gray.

With 451 characters in the film, and with many having multiple costumes and accessories, a huge effort was required to produce minifig models. The Robin model, for instance, had 31 version iterations. That's a lot of data, even for a superhero.

LEGO BATMAN BY THE NUMBERS

A whole lot of crew, bricks and rendering hours
went into making The LEGO Batman Movie



13,486,203,



Number of days spent
animating the film:

9,153

Biggest LEGO
character: Kraken

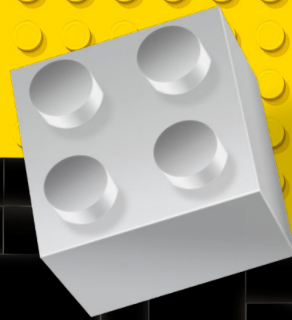
111,284

bricks



Largest amount of polygons in a single shot:

3,630,591,776,171

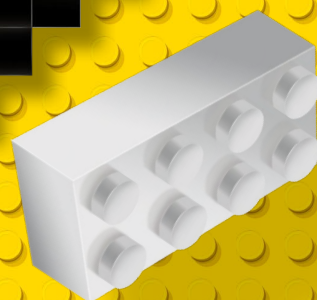


Number of light rays simulated
by Glimpse renderer:

269,559,350

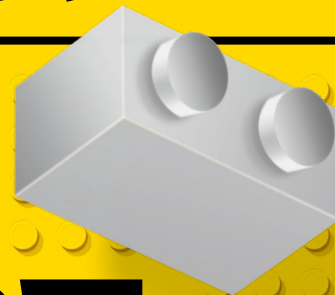
Number of unique
brick textures:

81,854



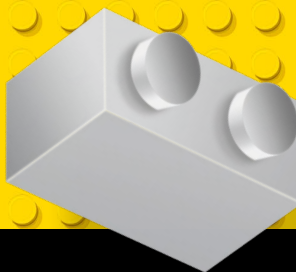
Largest LEGO vehicle:
B-52 Batplane

15,739 bricks



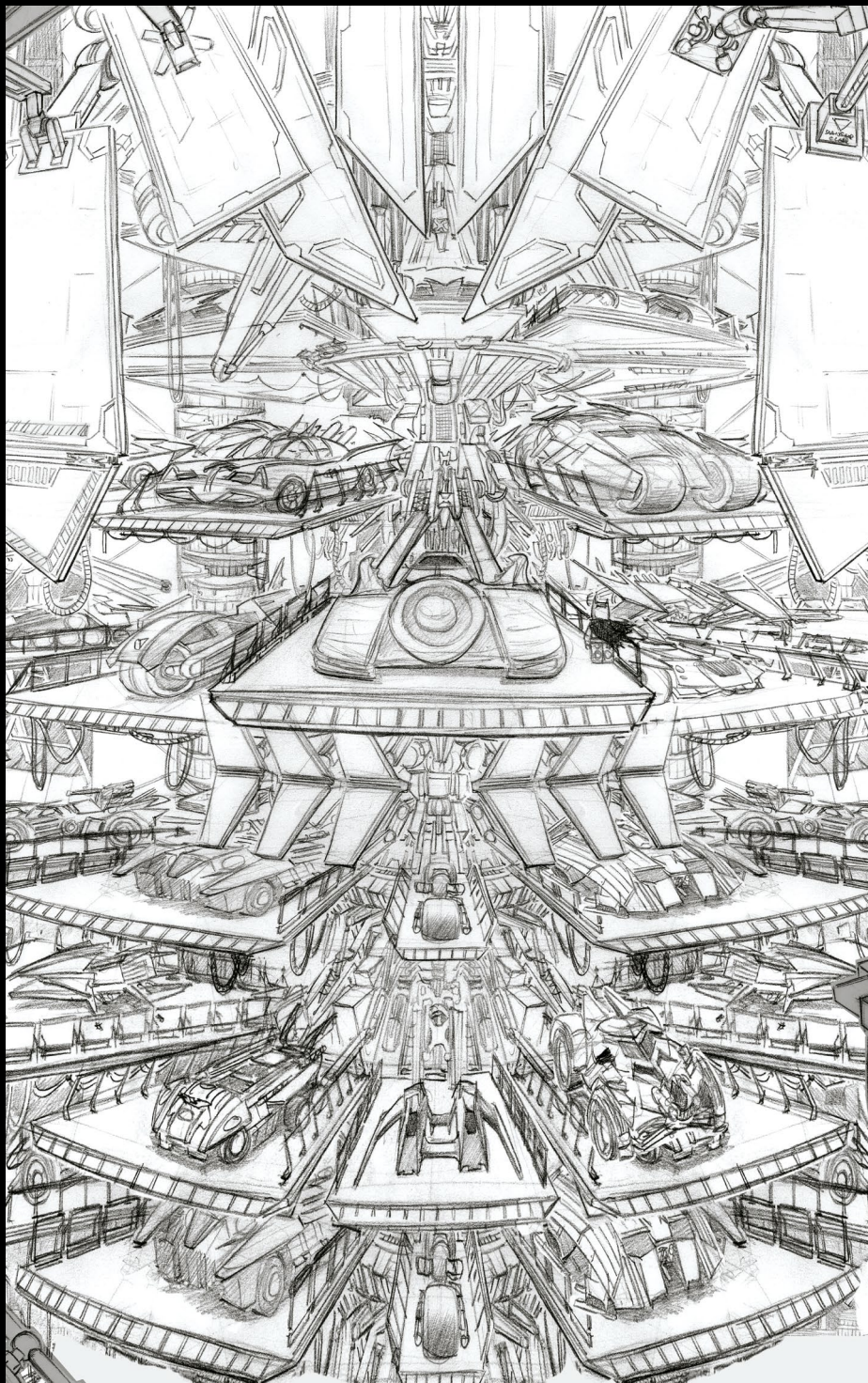
Biggest
LEGO building:
Wayne Manor

34,287 bricks



BUILDING THE BATCAVE GARAGE

How Animal Logic designed, modelled, lit and rendered Batman's impressive collection of vehicles inside the caped crusader's Batcave



A CONCEPT SKETCH OF THE BAT-VEHICLE ROTISSERIE

The level of detail, even in the illustration, was designed to show how over-the-top Batman's possessions in his Batcave were. It was based on initial storyboards. "From the storyboards," outlines production designer Grant Freckleton, "we essentially started breaking down what we saw in the reels or from the script and worked out what we needed to design."



THE 'SPICE RACK' MODEL TAKES SHAPE

This portion of the Batcave represented just one section of the voluminous environment. If built for real, the Batcave would be constructed out of 50,999,853 LEGO bricks, and take up 3,996 square feet. To help manage such enormous scenes, Animal Logic worked out ways to deal with repeating bricks. "For example," says CG supervisor Damien Gray, "when you build a brick wall out of 2x1s, it's the same brick over and over again, stacked. To make it easier, we'd create different Scratch and Warp maps and Displacements for those bricks, and we randomised the reflection of those maps for that brick when it's assembled into a single asset."





“In animation we’d always focused on doing a silhouette, but I said, let’s break with that”

Craig Welsh,
Lighting supervisor

LIGHTING FOR LEGO

In computer graphics, almost any kind of final look can be generated by an art team. But, just as it did on *The LEGO Movie*, Animal Logic went through a painstaking process of researching, then lighting and rendering *The LEGO Batman Movie*. Cinematography techniques borrowed from the physical world were adopted, and live-action films also referenced for their specific looks that also satisfied the Batman and comic book universes.

“Chris McKay said he wanted to go for a film noir style with the sort of colour saturation one might expect from some sort of hallucinogenic acid trip,” outlines lighting supervisor Craig Welsh, who studied many films in order to find examples of what might work in particular scenes or shots.

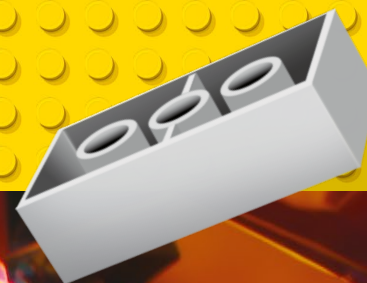
For example, in some of the scenes set inside Wayne Manor, Batman is shown arriving home seemingly to party after dispatching several villains, but is actually shown to be living a lonely bachelor’s life with no-one but Alfred for company. At one point he seems lost in a reminiscence from the moment he was tragically orphaned as a boy. Welsh wanted to help communicate how he might be immersed in that thought process, and turned to what real-world cinematographers had done for similar scenes.

“I had seen some films and TV shows by Cary Fukunaga, who did *Jane Eyre* and *True Detective*, and noticed that the director of photography was not traditionally separating the characters out from their backgrounds with rim lighting, but instead kind of melding them into the background,” observes Welsh. “I was thinking of this as a psychological thing and I thought, it’s like the characters are melding into their environment, and they’re kind of psychologically part of that environment and they almost can’t



THE BATCAVE IS BATHED IN BLUE

The final lighting and rendering of the Batcave made use of around 22,000 lights, many of which were made possible via a procedural lighting rig. “We identified bricks that were of interest to us to attach lights to,” says lighting supervisor Craig Welsh. “They might be part of practical light fittings or lights in vehicles sitting around the Batcave. Then we made a miniature light rig sitting at the origin of the scene that said this light belongs to this brick, and it has these parameters and does these things in terms of shadow casting and ray tracing. And then all those lights are propagated through the scene at render time in our in-house renderer, Glimpse.”



escape from it. And there was a similar approach by the cinematographers Hoyte van Hoytema and Adam Arkapaw and Bradford Young," continues Welsh. "So I pitched that to Chris McKay. In animation we'd always focused on doing a silhouette, but I said, let's break with that. Let's not have a rim light while he's being introspective and thinking about his family life and how lonely he is. Let's have him melt into the background. We'll still get separation so we can still see his bat ears and all that kind of thing with colour tones. Chris McKay loved it. I told him about all those DOPs I had been looking at and he was like, 'holy crap, we have to do that'."

Equally as important, Welsh also looked to many scenes shot by those cinematographers in question, in order to find examples of how *The LEGO Batman Movie* should look as if it was filmed with real cameras.

"Part of the brief on *The LEGO Batman Movie* was to make it seem like it was potentially filmed with real miniature LEGO brick sets and minifig characters," highlights Welsh. "So we thought, alright, if we were shooting it for real with real lenses we'd have some lens distortion. And then we had to debate about whether we should make it look like we're using miniature lipstick lenses or GoPros with their characteristic fisheye distortion, or whether we should lens it as though we were at human scale in a LEGO world. We ended up going with the second process because it's a more natural feel for storytelling, and everyone understands the language of camera at human scale."

Animal Logic even went as far as sourcing test data from actual Panavision C-series lenses and building the distortion parameters into its

virtual cameras, which was later reflected in the final renders. The studio also continued the development of a 'lens kit' that allowed artists to add in additional aspects such as stray light, flaring, dirty lenses and various other aberrations that come with real photography. The team also rendered depth of field for this film; traditionally something that had been done in compositing.



“We also selectively applied fingerprints on a model once it had been assembled”

Damien Gray,
CG supervisor

Much of this was also made possible thanks to Animal Logic's proprietary path trace renderer called Glimpse. It had begun development on *The LEGO Movie* and been used, alongside Pixar's proprietary RenderMan, for just a few shots on that film. Now the physically-based renderer has had a couple of years of further enhancement, with Animal Logic switching over to it completely for *The LEGO Batman Movie*.

"On this film," begins Gray, "we were able to get Glimpse to perform better and better and faster and faster and bring in some other techniques to actually accelerate the rendering time. This included de-noising tools, which helped with Glimpse because it's a progressive renderer. You can render an image very quickly but that means the image can be very noisy, and you get to a point of diminishing returns with rendering to remove the noise. So rather than actually rendering the perfect image, we would pick our moment, stop the renderer and then start to apply various de-noise techniques. We would never have been able to finish the film without it."

Thankfully, the film was finished, and Animal Logic's Sydney studio moved right onto its next brick-themed animated feature, *The LEGO Ninjago Movie*, due for release later this year. In the meantime, *The LEGO Movie Sequel* is taking shape in the Vancouver studio and is scheduled for release in 2019.

On top of all that, the Sydney studio has several features in either production or development, offering a wealth of new opportunities for Animal Logic to continue to innovate.



2017 Academy Award winner

150+ films and counting!

Thanks to all the artists who've supported us on this journey.

– Vladimir 'Vlado' Koylazov

2017 Scientific & Engineering Award

TO INFINITY AND BEYOND



AIDY BURROWS

In this exclusive guide, Blender masters Gleb Alexandrov and Aidy Burrows explore the key principles behind building beautiful galaxies in 3D

Think about *Star Wars*, for a moment. What brings those unending space vistas to life the most are the bright and bold planets that inhabit them, expertly constructed by ILM and the like to create a layer of believability and a sense of scale to help you feel at home in a strange galaxy (far, far away). These environments were built digitally – in modern films, at least – and although a big glowing orb floating lazily against a starry backdrop doesn't seem that tech at first glance, achieving a photoreal result can be tricky, and there's something of a lack of tuition in the field.

This proverbial black hole in space VFX education spurred talented videogame veteran Aidy Burrows and mad, caffeinated genius Gleb Alexandrov into action. Their video course, 'Space

VFX Elements – Creating the Galaxy In Blender', has been developed to help you achieve production-standard CG galaxies with ease. Their enthusiasm for the subject is palpable.

"Anyone who has spent any time writing 'hubble' into Google Images knows what I'm talking about – space is gorgeous," begins Burrows. "And then once you think about what you're actually looking at? That's crazy! It's hard to get a handle on it at all. And what a canvas it is for telling a story, new worlds where you can set the rules and reveal something about all of us by contrast. About what's important and about where we may be headed."

Alexandrov echoes this excitement. "Literally, just watch the Space X Falcon 9 landing," he chirps. "Or check the Hubble Space Telescope

photos of billions and billions of galaxies swirling around a supermassive black hole. Or maybe listen to how the Curiosity drone sings *Happy Birthday*, while exploring Mars for us. If it doesn't move you, I don't know what does. Artists and filmmakers, I think, see space as a cool background for their dreams. Some of them are just as geek as we are. Fortunately, today, it's possible to realise even the geekiest of space dreams using free software."

In this print exclusive, two of the most well known artists working in the Blender community today present their invaluable insights into creating the sorts of space environments that wouldn't look out of place in something like *Mass Effect* or even *Star Wars*. Sit back, fire up Blender and go get exploring.

FIND
OUT MORE
ABOUT
**SPACE VFX
ELEMENTS AT**
bit.ly/SpaceVFX

GLEB ALEXANDROV

MODELLING & TEXTURING

▼ HOW TO MIX THE PLANET SURFACE MAPS

Often we just want to quickly test our design ideas. We don't want to dive into texture painting or anything time consuming. Try this technique: download some real planet textures – let's take Mars, the Moon and Io (one of Jupiter's larger moons). So now we have these three surface maps. Let's mix two of them using the third as a mask. For example, let's mix Mars with the Moon using Io as a mix factor. Surprisingly, the result is a brand-new planet. You can pick the name!

THE PLANET SHADER: LAYERS



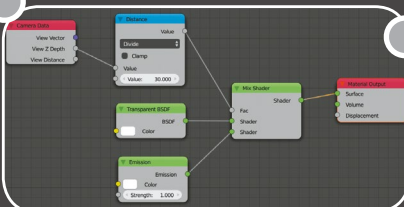
AIDY SAYS

"BREAK IT DOWN!"

Cthulhu be damned! Force the unimaginable monstrous enormity of everything into bite-size manageable chunks. For planet texturing, that could be broken down into making just controls for oceans, craters, rivers and city lights.

▼ USE DISTANCE FADE

When you're flying through those mesh planes scattered throughout an asteroid field, or that volumetric cheating array of planes we need to fade them out as the camera passes through, otherwise it can break the illusion. This is where the Camera Data node comes in. It's really pretty simple. We take the view Z depth and divide it by the distance we want the fade to take, so a value of 2 will mean that by 2 units away it'll be fully visible. With a value of 0 when the camera is right on the plane it'll be invisible.



▼ THE WORMHOLE DISTORTION EFFECT

Do you remember the awe-inspiring wormhole effect from *Interstellar*? It made me us excited as a child. This warping effect – from the moment we saw it, we wanted to reproduce it in Blender. The Space VFX course gave us this opportunity. Let's first create a sphere. Some kind of environment around this sphere is a must-have, too – after all, the wormhole is mostly about the environment. Focus on creating a 360-degree starscape in the first place. The core of the wormhole effect is a kind of gravitational lensing. In a nutshell, it can be done using the refractive shader. But here is a crucial thing: we can shift the Index or Refraction this way, so it increases on a glancing angle. Be sure to plug the Layer Weight node (set to Facing) into the Index Of Refraction socket.

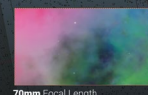


▼ CONSIDER THE LENS

The default focal length of the camera is 35mm. That's a good starting point for a lot of scenes. A low focal length packs a lot into the image in a confined space, while a high focal length gives us that zoomed-right-in look and compresses the depth in the shot. That's the sort of shot we might expect when we're peering into space. Plus, it helps fit the edges of all of our planes into the camera border.



15mm Focal Length



70mm Focal Length

▼ QUASARS AND VOLUME RENDERING

Quasars are the brightest objects in the Universe and, we would say, the hardest to render – especially their accretion disk (as swirling multi-layered stuff should be). Fortunately, Blender has an awesome Volume Scattering shader. The density of this shader can be driven by the Procedural noise, and the noise can be distorted by the spherical gradient. This step is crucial because the spherical gradient will give a circular motion to the accretion disk. That said, we can complement a physically correct Scattering shader with a fake effect. For example, add a couple of transparent planes with the stars and galaxies.



▼ ASTEROID MODELLING

One way to model an asteroid is to do it procedurally. That means to use the 3D noise to shape the asteroid. And what's even more awesome, this will allow you to create dozens of variations for free – zero time spent! In the end, it's a matter of swapping the noises and watching the outcome. In Blender, you can easily do this. Add a Displacement modifier, then feed the Procedural texture into it. Let it be the Voronoi texture (which is famous for cutting away parts of the object in a stone-like fashion). Alternatively, you can use the new Micropolygon Displacement feature of Blender 2.78. This way you won't have to bother about the crazy amount of polygons needed for the detailed geometry – it will calculate on the fly.



GLEB SAYS

"WATCH HOLLYWOOD & NASA VIDEOS"

Hollywood and NASA – very different sources but I'd recommend absorbing it all. The footage from the NASA probes like Juno is marvellous. Likewise, the *Star Trek* end titles by Andrew Kramer are pure inspiration!

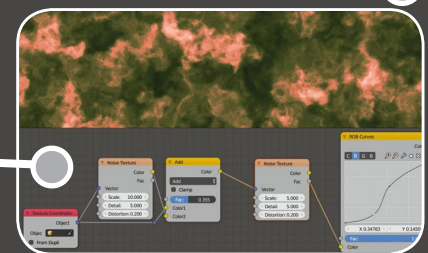
▼ FAST VOLUMETRIC SLICES CHEAT

To create space dust and nebulae you'd probably want to reach for the Volumetric tools for that smoky/cloudy look. We could do that, sure, but the simulation and rendering times can be astronomical, too. Sometimes we can get around all that by just taking stacked slices of Procedural noise. Just have it plugged into a Mix shader mixing between Emission and Transparency. Using an array of simple flat planes we can use our 3D noise. So long as we keep the camera facing those planes, the illusion should hold up.



▼ LOTS OF NOISE!

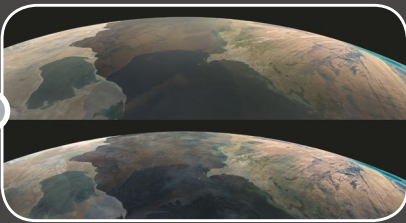
Nature is noisy, seemingly at every scale, whether it's the noisy movement of the tiniest pollen particles suspended in still liquid to the noisy arrangement of stars in the sky. To get natural results, then, we should be noisy. Our thinking should be noisy and we should be noisy in the way we use our noise. We want some noise informing where we want our transparency, and we want some noise informing the colours of the parts that are more opaque. Wherever you can put some noise – go crazy with it!



GET READY FOR YOUR CLOSE-UP

SEAMLESS TEXTURES

The first way, as we found out, is to use the seamless detail textures. Scale these textures dramatically, and they will tile. Then blend these tiled textures with the original one. 'Wait, what about repetition? Won't it look noisy as hell after you repeat the texture 20 times?', you might ask. That's true. At such scale, repetition gets out of control. Fortunately, we can manage it. Try breaking this mixed texture into different tonal range areas, namely the dark and the light areas. Say you'd like to bring the details to the dark areas. Stay within the low values of the tonal range, and vice versa.



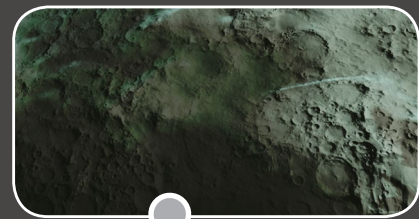
AIDY SAYS

"ATMOSPHERE AND THE ARTIST'S DILEMMA"

Things can get pretty scientific in space, like atmospheric rayleigh scattering in the atmosphere. But as much as it may pain me choosing between scientifically accurate and artist fakery/friendly techniques, I almost always choose the latter.

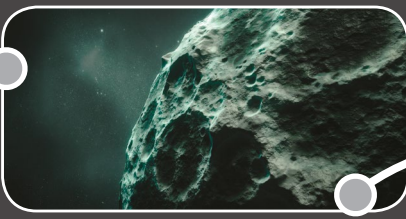
DISTANCE-BASED DETAILS

The second way is to reveal the details dynamically. In the Blender node editor you can sample the Z-depth of the camera. That means we can change some properties based on the distance between the camera and the object. Perfect! We can use this to fade the textures in or out. So you modelled this awesome exoplanet. Now add the micro details like craters, and hook it up to the camera Z-depth. We call it the level-of-details hack. For those of you who have a background in game development, like Aidy, this should sound familiar.



MICROPOLYGON DISPLACEMENT

'Okay, but what if I place the camera really close? Say, a few miles above the surface?' Then the third way to increase the resolution is to use Micropolygon Displacement. This feature was recently added to Blender 2.78. When we saw it, we nearly spilled coffee on our pants. Now we can generate the real geometry on the fly and not burn our computers. That's how it works. First you activate the Adaptive Subdivision checkbox in the Subsurf modifier, then you drive the Object Displacement by the Material nodes. The object gets subdivided based on its size in pixels (and then displaced).



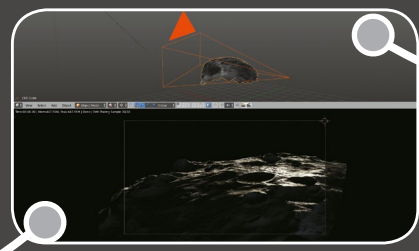
GLEB SAYS

"ATMOSPHERE HELPS TO SELL A 3D PLANET"

Atmosphere really helps to sell a 3D planet, if your planet is not a dead rock - the low, thick, woolly clouds; the high, mist-like clouds; and my personal favourite, the atmospheric scattering effect. Multi-layered atmosphere is the hallmark of a great planet shot.

CAMERA VIEW CULLING

When we first tried zooming in to the exoplanet surface and rendering, our happiness was spoiled. We got an error that claimed, "Not enough memory". Then we knew we had to invent a way to hide the geometry outside the camera view, otherwise it consumed all of our video memory - and wanted even more! Micropolygon rendering is that hungry. We ended up using the Mask modifier, driven by the Vertex Weight Proximity modifier. It allowed us to show (and therefore displace and render) only what the camera sees. Say hello to mountains and craters!



GO PROCEDURAL

▼ PLANET RINGS

If we're only seeing the rings from afar we can do away with the millions of individual bits of rock and ice that make them up and just use a texture instead. We'll need a wave texture set to Rings (surprise, surprise!), then we'll plug this into the Vector of a Noise texture. Now we'll have some randomised distribution but still in a ring formation. Then increase the Contrast with a simple colorRamp node and voilà - we've done the hardest part.



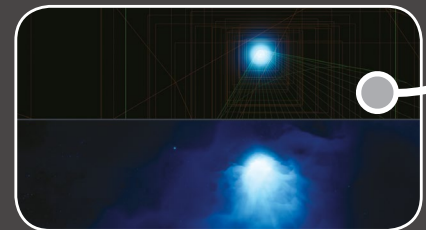
AIDY SAYS

"GO FLEXIBLE WITH PROCEDURAL"

The beauty of procedural creation is that you can customise to an infinite degree. Want to control the size of the continents? Done. Want to animate some clouds, but want a little more swirl? Done.

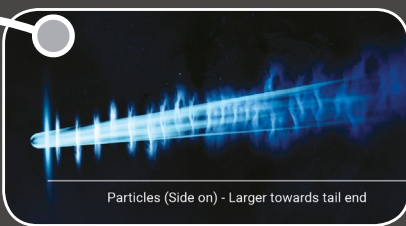
▼ CHEAP CHEATS WITH GLOW PLANES

Rather than not being able to see the effect of a large glow until the end compositing stage, it's good to add one in early on using textures. All we need is a plane with a gradient texture set to Sphere. Be sure to be using Object Coordinates - that'll make sure the circle radiates out from the origin at the centre of the plane. To get a better falloff we want a Math node set to Power - use a value of at least 2, which is the standard quadratic falloff light tends to exhibit in the real world.



▼ CONTROL PARTICLE SIZE WITH TEXTURES

Here's a cool, almost hidden trick. We can use a particle system to create a trail of particle planes to form a comet trail. Ideally we want the particles to get larger the further they are to the end as if it's all spreading out. We can scroll down and find the Textures area. Hit the New button to create a texture and then change this to a Blend gradient image type. The coordinates need to be set to Strand/Particle and the influence to Size. Now you'll see that the gradient controls the size from black (minimum) to white (maximum).



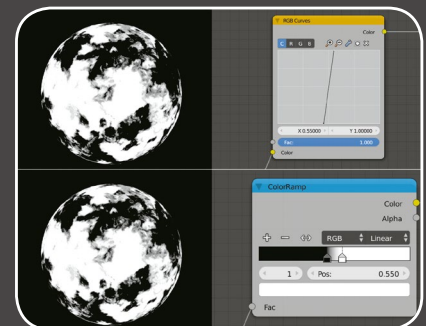
GLEB SAYS

"PROCEDURAL NOISES RESEMBLE SPACE PHENOMENA"

Procedural noise is a maths function, which creates the intriguing visual patterns. It's fascinating how these patterns can resemble the real space phenomena - a Jupiter super storm, a spiral galaxy, a nebula. Crazy!

▼ BEYOND THE COLORRAMP (CURVES TO THE RESCUE)

The colorRamp is super useful, but it can be a little too simple sometimes. Luckily we can get the same kind of results from an RGB Curves node but with some extra controls thrown in. Change the X values of the far left and right points on the curve to replicate the colorRamp. Now we've got a Factor slider, so we can back off the effect if we want - very handy! It's great when you want to procedurally control those continent sizes.







Weapons are fairly stylised but still recognisable with real-world toy and fantasy weapons

UNREAL FIDELITY: ROBO RECALL

Epic Games has published its first VR game, but what does it take to build for virtual reality from scratch using evolving features in Unreal Engine?

When Epic Games debuted its VR shooter demo *Bullet Train* at Oculus Connect 2 in September 2015, there was a lot of excitement over where this VR experience could take the videogames developer. Boundless possibilities and speculation arose from fans, though there was just the short demo presented: could the demo push Epic Games to publish a whole VR game, based on *Bullet Train*? Could this mean an even more empowered Unreal Engine with top-of-the-line VR features?

For a while there was no news at all, but little did the fan community know that Epic had started work silently on another project in April 2016. Over the next ten months, five team members beavered away in Cary, North Carolina, where Epic is based, constantly going back and forth between planting headsets over their heads and tweaking assets on their computers. Finally, at Oculus Connect 3 it was revealed that this project was *Robo Recall*, the company's first virtual reality game: a first-person shooter built for the Oculus Touch controllers and available for free.

In *Robo Recall*, the player is a RoboReady employee tasked with recalling unruly, defective customer service robots by using a whole arsenal of tools. Epic called *Bullet Train* "a spiritual predecessor" to *Robo Recall* and it's evident how different the demo is in its straightforward gameplay. Compare this to *Robo Recall*, which is designed to be an enjoyable, immersive real-world environment with a distinct, vibrant design.

Its visual inspiration harks back to older games, as Epic Games' art director Jerome Platteaux tells

3D Artist. "We wanted to do something that feels good to go back in, something that is visually colourful and the player feels happy to be in every day. My response was old-school games like on the Neo-Geo and even *Super Mario*, we used a lot of primary colours like in *Super Mario*."

Most noticeable of these influences are the retro damage-dealing effects; messages like 'headshot' flash up in a bright-red gradient when the player shoots the robot's head with precision. "[Those classic games] use these really cool primary colours for different things like burning or healing, those type of things, so it's a really efficient visual language," says Wyeth Johnson, lead technical artist. "We kind of took that approach as, 'Okay, how do we communicate as much as possible in a [small] number of frames?'"

It's a significant question to ask, with unforgiving consequences, he says. "If we're not at 90fps, if you miss your performance target in a



“Everything we develop for Robo Recall is actually going to be shared with the community”

Jerome Platteaux,
art director

console it's a little bit annoying, if you miss it in virtual reality, you're literally making someone sick! There are real ramifications to making sure that the player has the absolute best experience they can. Unreal Engine 4 has been completely rebuilt from the ground up for virtual reality.

"We switched to the forward renderer, and the biggest thing that this gives us is visual clarity. We've rethought rendering in VR from the ground up to provide the sharpest, most crisp, colourful image to the viewer... we're learning that that's really something that the viewer responds to."

Another aspect that needed rethinking in the VR landscape was the effects. "We had to really rethink how we present things so they look like they have volume inside a VR headset," says Johnson. "Something that might have taken a few minutes to create, like a smoke puff, now needs a couple of weeks of R&D to get right so it's been a really interesting experiment in presenting a two-dimensional thing in three dimensions."

During development time, Johnson would put on the Oculus Rift headset once every hour or two hours for testing and iterating. "When we started this project we spent literally months trying things that normally would have worked without fuss and without any problem and went 'nope that's not right'. I feel like I'm back in school again! This is my 16th year making games and I feel like it's my first." The back-and-forth iterations was an important part of the process for the entire team, though the time spent in the headset would differ depending on the stage of production and the



“We’ve rethought rendering in VR from the ground up to provide the sharpest, most crisp, colourful image to the viewer”

Wyeth Johnson,
lead technical artist

asset that needed to be worked on. Real-world objects would take less time to check than, say, the lengthy limbs of a robot with stylistic proportions. It's a diligent way of working, not least compounded by the necessity to translate proportions properly from monitor to VR. "We feel like something feels good on the screen then when you put on your headset and check again in VR, there may be proportions that feel different or are perceived very differently," says Platteaux.

This was one of the biggest changes for senior mechanical modeller Pete Hayes. Like the other mechanical modellers at Epic, Hayes had been using 3ds Max and MODO: the same set of tools he'd been accustomed to for years during *Robo Recall*'s production. "The biggest difference is

taking stuff into the editor and utilising Unreal Engine 4 to see what works and what doesn't work in VR and crafting artistically towards that," he says. "It's similar in a lot of ways but different always, visually, and always being in it, having the headset on to triple-check things, to make sure they feel right in VR versus looking right on the screen... The biggest advice is just don't trust what you see on the screen, you have to test it in VR and make sure it's on track and feels good."

One of the principal ideas during the game's conception was to create a sense of comfortability and return value for the player, so having the robots as the antagonists was key as the cold hard-surface models helped to avoid the guilt associated with shooting more humanoid characters. Disproportionate environments and models can be jarring for VR experiences, too, with every member echoing the same sentiment: scale plays a pivotal role in immersion and VR. "We paid attention to make sure the proportions are correct and so that it's easier for the player to evaluate where it is and how it feels in the environment," says Platteaux. "It's easier... for the player to connect, especially in VR."

Virtual reality is also creating a new way of gauging scale, says Ignacio Guajardo-Unanue, senior artist generalist. "Previously, in other games, the character in the game would be your scale reference. In VR, you are the scale reference. So if a door is too small, you definitely feel it so scale has to be just right."

Hayes, on the other hand, tells the duality of scale, of its difficulty and how motivational it can be: "The challenges of modelling for VR is actually the same thing that's great about it. Because you can see your models in a real-world scale at any and all angles, you have to ensure every square inch is perfect and detailed realistically to what you would expect in the real world."

"So if I create a 20-foot-tall robot for a regular videogame it's still going to look small on a screen. Viewing that same robot in VR is a completely different experience because you can get close to it, look up and feel that it's 20-feet tall. Being able to view and interact with them in a VR space makes them feel more real and tangible."

Mechanical details were placed around the robots' necks at the player's eye level and environment props in the world would aid in being a reminder of the scale too. Achieving these set areas of flourishes, and creating a uniform style while balancing the quality of assets against the short development time, was critical. Hayes explains, "We started with a lot of existing kitbash mechanical objects that Mark [Van Haitsma, senior mechanical modeller] had done. So within those robots, we shared a lot of those little fine details and pieces – even though every single robot in the game is very unique they all maintain the same sense of visual style like they all were manufactured by the same company. So that gave

FINE-TUNING FOR VR

Epic Games reveals how it optimised its game asset workflow for virtual reality

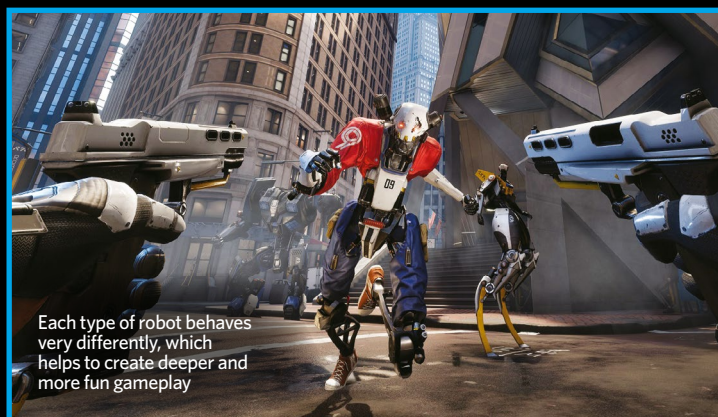
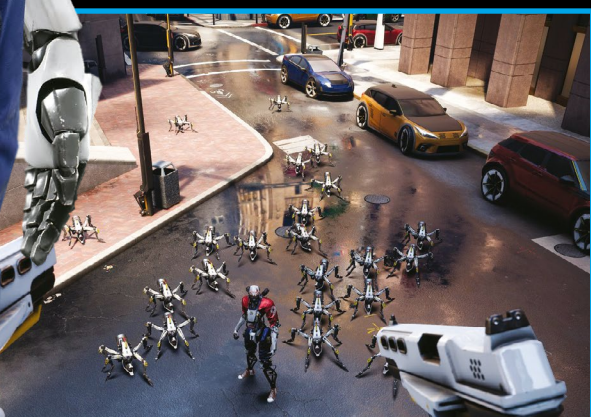
"The biggest technical roadblocks we have as modellers is [that] Normal maps are less effective in virtual reality," begins Epic Games' Pete Hayes, senior artist mechanical, "and that's the very small details, so you have to make sure you have enough geometry to support the medium to large forms because you won't be able to fake as much... The other hand is the materials – we can't do super-complex materials because drop calls are one of the biggest things we need to limit."

To ensure that detailed models would translate in VR without breaking the immersion, Hayes explains that the back-and-forth iteration processes assisted in keeping the production efficient without compromising on quality. "We model very detailed prototype meshes and then test them out in-game before we really spend any serious time on high levels of details and then proceed very cautiously towards that final goal, especially as we're on such a short development time. Once we spent that time to

do that super-high detail, it plugged in, we knew what to expect and it looked good."

"The other big thing is knowing your budget," says Jerome Platteaux, art director. "In VR we are constantly optimising. Even a robot – we know exactly the final budget for that robot, we know this robot is not over 20,000 verts and it's not going across more than two maps."

This restriction with verts and the budget is a slight departure from how games were previously built for console. Yet Platteaux says that the overall process is still the same, it's just that now the restrictions apply in different areas. "We think of the environment and architecture based on restriction. '[So you think] okay, I'm not going to create a forest, so I'm not going to create something that has a lot of foliage just because we cannot afford it in VR'. We need to anticipate: here's my budget, what can I do with that? I would say that it's like any other game – we need to know what the budget is first and then figure out what can work with that budget."





A big VR lesson for the team was trying to respect how easily a player can be overwhelmed

us consistency visually but that also enabled us to share a lot of the mechanical parts within them. So that's one of the ways we accelerated our development time and even with that, we were still working extremely hard to pull everything off, but it definitely made it all easier."

"One of the conversations we had early on was, 'What is one of the most efficient type of assets that we can build that looks really great in VR and has a low production burden?'," explains Johnson, "So, when we thought about the style that you see now in *Robo Recall*, of these large, clean, simple robotic shapes with really focused small amounts of detail only where they really matter - that was a very calculated choice on our part because we knew we could bring in an incredibly high-quality bar to the efforts without needing to spend weeks and weeks modelling them."

Some environment props were outsourced to a secondary team with instructions to create the appropriate scale, colour and albedo. Johnson says that this was a "tactical" decision, as it enabled the team to focus on the stylised models: "The really important things that were really the heart and soul". This step was crucial, as the team was able to "maintain our quality bar without killing ourselves on the production side".

The use of Unreal Engine 4 and physically based rendering was another major contributing factor in quickening production, says Johnson. "We now don't have to spend a ton of time texturing because the assets just look real out of the box if we get our pre-production steps right."

Platteaux adds to the benefits of the engine's VR features being free to use and download by anybody. The VR editor was used to build *Bullet Train*, while the normal editor was used to build



Previously in other games, the character in the game would be your scale reference. In VR, you are the scale reference

Ignacio Guajardo-Unanue,
senior artist generalist

Robo Recall: "The good thing [is that] everything we develop for *Robo Recall* is actually going to be shared with the community. Every time there's a new feature in the engine, we actually release that in the next release. Every time we have a problem, we try to solve it and everybody gets the result of it, so that's a great thing."

It's clear how thrilled Epic is to work in virtual reality, to rebuild Unreal Engine for VR and to ship *Robo Recall*. The company's passion for enriching developers with its product shines through when asked about about a wishlist for Unreal and VR: "I think when you talk about Unreal, efficiency is the name of the game," says Johnson. "We need to let teams of really small, talented passionate developers make incredible VR experiences with as little effort as possible. Removing the technical barriers, the things we're fighting now, our hope is that the future teams won't have to fight with them: the struggle with performance, struggle with optimisations, struggles with fidelity, with physically based rendering."

EPIC EXPERIENCE

Epic Games explains what its version of the VR buzzword 'experience' means

"We want to make you feel like a total badass," begins Jerome Platteaux. "The more the players find creative ways to destroy robots, the more points they earn. *Robo Recall* offers satisfying gameplay and loads of replayability. We want the game to be as much fun to watch as it is to play. I cannot wait to see YouTube videos of players executing awesome combos."

"The environments are based on existing buildings and streets in order to get the proportions of our levels as close to reality as possible. The more the environments feel familiar and believable, the stronger the sense of immersion is. I wanted the experience to feel grounded, to help the player understand his surroundings and evaluate the distances of his enemies faster."

Ignacio Guajardo-Unanue says, "*Robo Recall* is a VR experience that tries to fully immerse you with its many interactive elements to get different results. You want to grab bullets? You want to block bullets? You want to shoot at bullets? You want to block some, grab another, and throw it at an enemy? You can do it! You want to grab an enemy, tear its head off, throw his head at another robot, shoot that robot mid-air, grab him, and throw him at another robot? Do it! There are many ways to deal with combat and its flexibility allows you to be creative."

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14 ADVANCED ZBRUSH SKILLS

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Remodel the way you work in ZBrush and discover how to start working with our advanced tips for creating high-res realistic sculpts today

A lot of us will use ZBrush for sculpting. We may all know how to manipulate ZSpheres to build up a creature mesh, combine SubTools for a character model or how to push and pull our sculpts with the Move brush, but there are plenty of other features inside of the much-loved tool that you should start using and paying more attention to.

Take brushes for example. Have you ever considered going the extra mile and adding more finesse to your sculpts by creating your own custom brush?

Or what about using Alphas? There are over 60 of these available inside of ZBrush for deforming your surfaces, but creating your own Alphas can

make way for more detail on your sculpts and a more elegant finished result.

You might have given FiberMesh a bit of a look in and understood how to use it to create hair and fur, but what about its sister tool, NanoMesh? Have you thought about what kinds of fantastical meshes can be populated and the inspirational abstract art you could create just by manipulating a few more parameters?

To find out exactly how to work with these features, we gathered some of the best ZBrush minds to tell us just how they make the most out of the tool. So delve into these 14 essential techniques for advanced users and learn how to make ZBrush truly your own.

01 ZREMESHER FOR RETOPOLOGY

Always use ZRemesher on a duplicate of your sculpted mesh! This can act as a backup and will let you re-project sculpting details. Also, try to avoid small holes in your mesh.

You can run the ZRemesher again once a mesh has already been ZRemeshed, as this will make the topology cleaner. However, it might not follow the original mesh in an accurate way, so after this subdivide the new topology and re-project your original mesh.

If you are using Symmetry and are unhappy with the resulting topology, go to Undo and then try ZRemesher's second symmetry method by holding Opt/Alt when clicking ZRemesher.

There are a few ways of refining the result of ZRemesher. One way is to use PolyPaint. In areas where you want the topology to be denser, paint the mesh in red, while in areas it needs to be less dense paint it blue. You can also use the Smooth brush in between to get a nice transition.

One trick I found to be very useful is to Polygroup your mesh before using the ZRemesher. This can help in different ways, as you can Freeze Groups or Keep Groups.

If you do Freeze Groups, ZBrush will retopologise each Polygroup independently, keeping borders frozen and then welding the edge vertices together along each Polygroup border.

If you use Keep Groups, ZBrush retains the existing boundaries of each of the model's Polygroups to reproduce those groups in the retopologised model. I use Keep Groups quite a lot as it can help get rid of spiralling in the topology.

Andrei Szasz

02 TEXTURES IN ZBRUSH

So I want to explain a really helpful trick for adding realistic details to a face using photoscans. For this trick you should have a low-poly mesh with subdivision levels. I don't add a lot of small details for my mesh by hand, only base forms and shapes like big scars or scratches, which can affect to the topology.

First, create UVs of your model. This is really important. For the UV unwrapping you can use ZPlugin UV Master. The second step is to use Spotlight to project photscan Displacement maps to your mesh as a Polypaint (Diffuse map) and loading this map in the displ.map slot in ZBrush. Next, export the Polypaint texture with Multimap Exporter and load this map to the Displ. map slot in ZBrush. Now change the intensity in the Displacement map menu and look at your skin details. When you see your skin structure with the Displacement map you can add any folds and smoothing; anything you want but your skin structure never will be smoothed. This will really help us understand where we need to sculpt details by hand, perhaps by adding more interesting skin structure and combining Displacement maps and geometry. After that we should apply

our disp.map to our mesh. You can turn off the disp.map and export a second Disp map with folds and big details.

You now have two Disp maps (pores and folds, for example) and this will give you more control for rendering later. You can bake all the maps you need with the Multimap Exporter. After that, draw skin colour, a Translucency map and others the same way with Polypaint, Spotlight and Export.

Artem Gansior

03 MATCAP MATERIALS AND LIGHTING

Using MatCaps is a great way to quickly visualise your model in both different lighting conditions and materials. Changing MatCap while sculpting can get you a fresh perspective on your model.

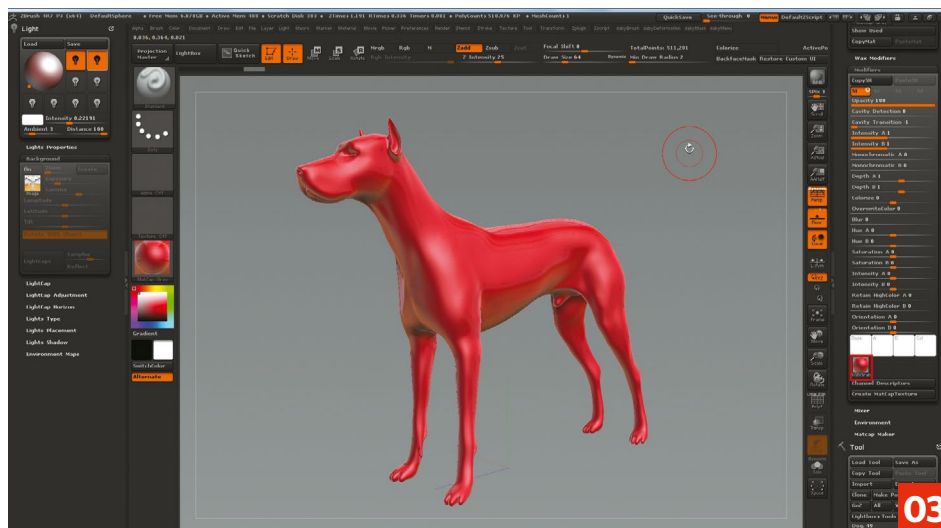
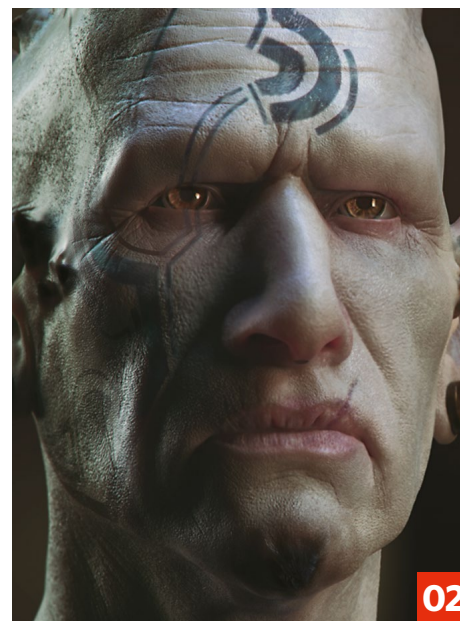
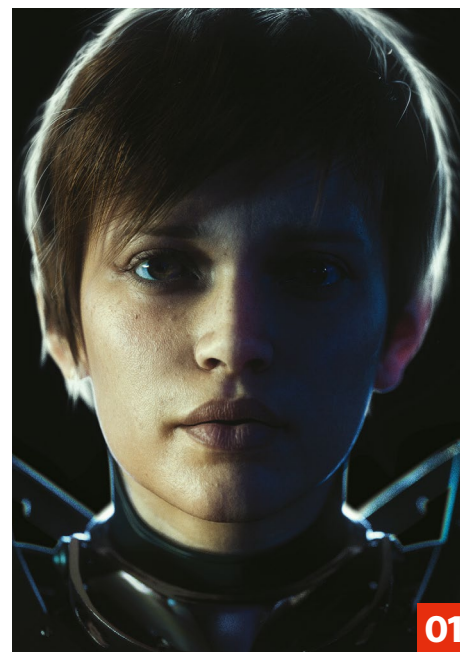
MatCap is a type of material that is lighting prebaked as a mirror ball texture applied as a 'faked reflection' onto the shading of your model.

First, create a new ZProject with the default sphere. Load the Basic material in your Material slot. Load texture01 in the Texture slot. Choose widthto1024, heightto512 and press Clone in the Texture palette in order to create a smaller clone of the texture. Open the Light palette and load the new HDRI texture into the Environment texture slot in the Background subpalette. I changed these Material settings: Specular to 51, Noise to 0.1, Env. Reflection to 80, Colorize Diffuse to 100, Colorize Specular to 10, Reflection Fresnel to -1.4 and Reflection Blur to 2.

Go to the Tool menu and select the MRGBZ grabber tool. Press Switch in the popup menu. Drag a rectangle over the ball in the viewport in order to make a mirror ball texture of it.

Select the MatCap Gray material and replace the mirror ball texture in the Material Texture 1 slot. Please note that you can create a MatCap texture from any rendering application by setting up a material and some lighting and render out a mirror ball texture.

Daniel Bystedt



04 PAINTING IN ZBRUSH

Polypainting in ZBrush is a great way of getting some colours on your sculpt. This is very useful when doing concept work, since it's not UV dependent and can easily be projected between different geometries early on in the process. Usually I colour my models simultaneously as I'm sculpting, since colour changes how the model is perceived.

I always start by blocking in colour gradients with a clone of the Standard brush set to affect RGB only. If the character has thin skin, I put a subtle yellowish hue around where the bone is visible (cheekbones, forehead and so on). Eye sockets tend to go towards darker values with a blur/purple hue. When painting on thin meshes, it can be useful to activate Backface Auto Mask in Brush>Auto Masking. To create skin tone variations, create a new layer and paint with a clone of Standard brush, with Stroke set to Color Spray and a Color Intensity Variance to 1 and using Alpha 08. When using layers it's helpful to paint in high contrast and then lower the Opacity value on the layer itself, since ZBrush does not have additional blending modes on layers.

More skin variation can be added by loading a concrete texture or similar into Spotlight (Texture>Add To Spotlight) and project paint it onto the model by painting on a new layer. You can change the contrast of the image by using the Contrast button. If the colour reaches black, those pixels will be considered transparent by Spotlight.

Daniel Bystedt

05 CUSTOM CURVE BRUSH

I like to create custom brushes to generate something that fits in my workflow: it's a simple tool that can easily be adjusted or modified. In this example I'll show you how to create a hair brush. It's a simple but nice curve brush that can be quickly corrected to your own specifications.

Load up a simple box in ZBrush and extend the sides with ZModeler a couple of times. The width of your box will define how big your hair strain will be later on. Make a few extractions and delete the top and bottom part of the box. Now place your box correctly on your canvas and press W to make it all into one PolyGroup. Under the Brush palette press Create Insert Mesh and create a new Insert Mesh brush.

Open the Stroke palette and turn on Curve mode, then go to the Curve Modifier tab, select Size and flip the Curve Falloff horizontally. Now adjust the modifiers one more time in the Brush palette by selecting Weld Points and Stretch. Now you have your own curve/hair brush.

When you create a couple of brushes you can make some nice-looking hair. It takes a bit of practice to apply them, but the results look great. And don't forget to close up your geometry with Modify Topology and choosing Close Holes.

Maarten Verhoeven

06 PROCEDURAL SURFACE NOISE

I don't use Apply To Mesh to create procedural surface noise. Use MaskByNoise and sculpt the detail into your mesh. I use the Standard brush with Drag Rectangle to pull out large areas of detail at once. This gives you a lot more control over how it is applied to your mesh and makes it look less procedural. If you're having a hard time seeing what you are doing with the mask visible, press Cmd/Ctrl+H to hide the mask.

You don't have to get every bit of surface detail by using one Alpha or NoiseMaker preset. Break the surface detail up based on patterns or height levels and use a few NoiseMakers, using Layers to blend them together.

Play with all of the settings, combining the NoisePlugs with Noise Curves to see the flexibility and limitations of NoiseMaker. Save out your NoiseMaker Presets. Create a library for re-use.

You can also save out your Noise Maker to an Alpha if you would rather apply the detail at different scales or orientations manually with a brush. In the Alpha tab, you can set a texture size and press Create From NoiseMaker.

If you're not getting what you want in Surface Noise, you can import seamless Alphas created in Substance Designer and use Surface Noise to tile it across your mesh.

David Schultz

07 BPR RENDERING

The Best Preview Render (BPR) can provide some quick, rendered results in seconds, with easily tweakable colours and materials. First, in the Light palette, move the light and adjust the intensity as desired. For the Material I'm using gw_max_blinn with main colour set as light grey.

Switch on Perspective, then go to the Draw palette, and set Angle of View to 70. Now set the Width of the document size to 4,906 and turn on AAHalf. Now in the Document palette, go to ZAppLink Properties>Create views>Save ZAppLink Views.

In the Render palette, go to the Render Properties sub-palette and set Details to 3. Toggle on AOclusion and Shadows and go to the BPR Shadow sub-palette. Increase the Ray Number to 500, increase Resolution to 6,000 and set the Angle to 30. Next, go to the BPR AO sub-palette and increase the Ray Number to 400, set Resolution to 4,000, drop Blur to 0 and render.

In the BPR Renderpass sub-palette, export Shadow, AO and Mask. Now, in the Render Properties sub-palette toggle off both Shadows and AOclusion. Hit Render. In the BPR Renderpass sub-palette, export new Shaded.

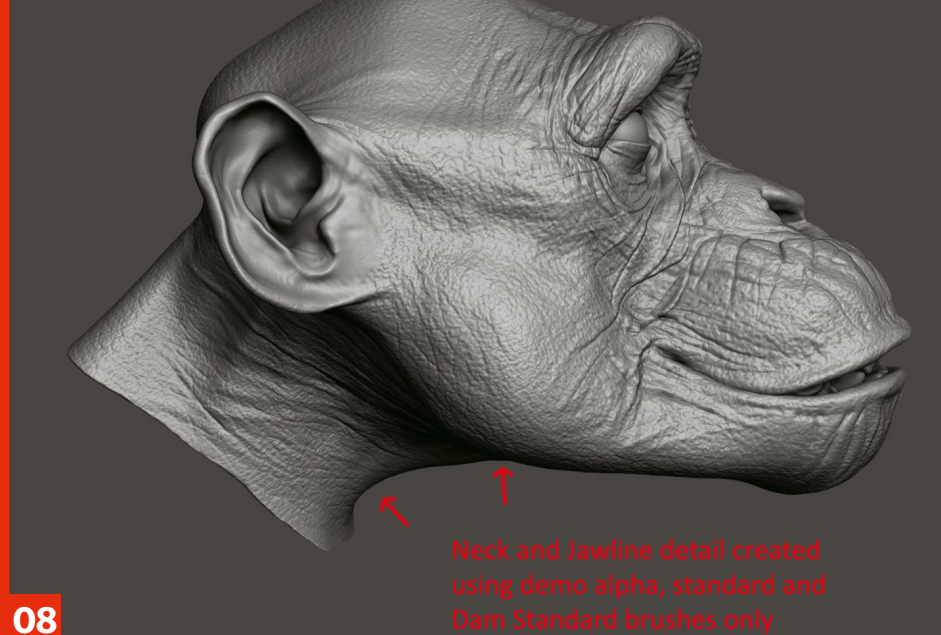
For Specular and Rim passes, go to Material>Material Modifiers and set Ambient and Diffuse to 0 and Specular to 6. Then go to Lights and set Intensity to 10 and Ambient to 0. Go to BPR Render Properties and check that Shadows and



05

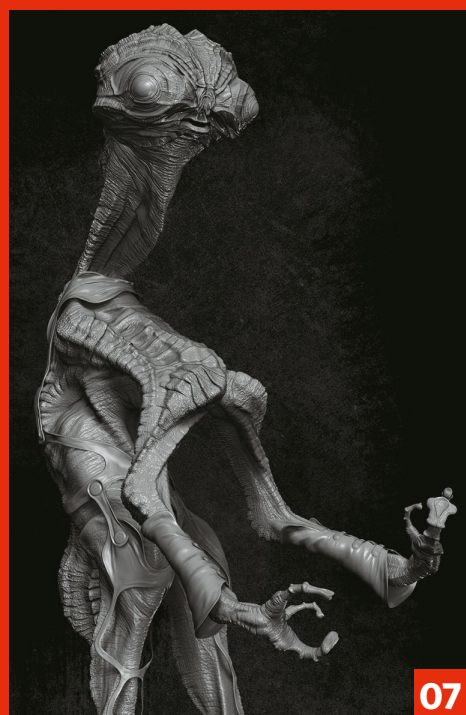
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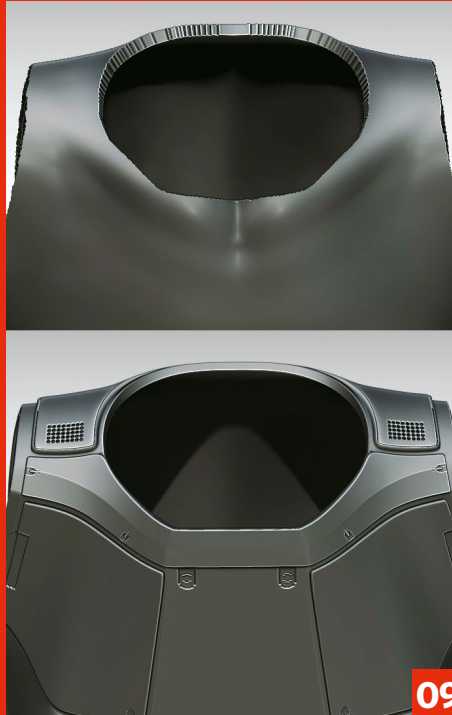


08

Neck and Jawline detail created using demo alpha, standard and Dam Standard brushes only



07



09

06



AO are off and render. Now create a few varied Spec and Rim renders and save each one.

Tristan Schane

08 ALPHA CREATION

With this Alpha creation method, we can add some details to our sculpt using images. Alphas work great with the DragRect stroke. Get a free-use image and open it in Photoshop and Desaturate. Use a blurred mask to select the area to use. Then save as Sand_Skin_1. Open ZBrush. Set the Doc size to square dimensions for the best results. In Tool, go to Quick Pick>Plane 3D and Convert to Polymesh3D. Then go to Tool>Geometry and toggle off SMT. Increase the res to 4 million and go to Morph Target>StoreM. Next, go to Alpha>Import>Elephant_Skin_1. With the Mask brush active, hold Cmd/Ctrl and go to Stroke>DragRect. Next, go to Alpha, select Elephant_Skin_1 and drag the mask onto the plane. Using the mask, sculpt on the plane to refine the Alpha mesh using your own favourite techniques. Save the project.

Turn off Perspective. Fill the doc with as much of the Alpha sculpt as possible, then go to Alpha>Transfer>GrabDoc. The new Alpha appears in the Alpha window. Export and open in Photoshop. Create a black-filled bottom layer. Using Layer Mask, fade out the edges of the imported ZBrush Alpha layer. Name it and save. Go back to ZBrush and import the Alpha.

Tristan Schane

09 CLEAN ZMODELER MODELS

ZModeler gives me an incredible amount of control when it comes to creating clean edges that I would never achieve from simply sculpting. Removing and creasing edges in conjunction with QMesh has helped to get clean, hard-surface designs that were based off organic shapes. ZModeler is a great tool for turning organic sculpts into hard-surface objects. As long as you keep your topology clean, ZModeler will really come in handy. I sculpt from a sphere, using DynaMesh to block out the basic shapes and then use ZRemesher to get clean topology. I make sure my target polygon count is fairly low because the fewer quads we have to work with, the easier this process will be.

Once your mesh is in quads, ZModeler will do a lot of the heavy lifting. We can remove edges (by going to Insert Edge Loop, hovering over an edge and holding Opt/Alt) to create large chamfers that make certain areas look hard surface. A combination of removing edges and creasing certain edges to retain hard-surface continuity is key for transforming sculpts. Be sure to check the Dynamic Subdiv to see how well the shapes are holding up. Use this in conjunction with the Move brush and QMesh. It will give you a lot of freedom for creating organically shaped hard-surface panelling. Use Alphas to add even more detail.

Travis Davids

10

SKIN AND CLOTHING DETAILS WITH ALPHAS

Digital sculptor Marlon R Nunez teaches us how to create folds in ZBrush with Alphas

LIKENESS SCULPTING

Here is where I spent most of the time. First I created a relaxed face. Working in layers is the best approach to be able to work on likeness and facial expressions later on, as it's an easier way that you can amplify or decrease the layer effect over the base. Once you feel confident enough, you can bake out all the layers you have used.

MARVELOUS DESIGNER + ZBRUSH

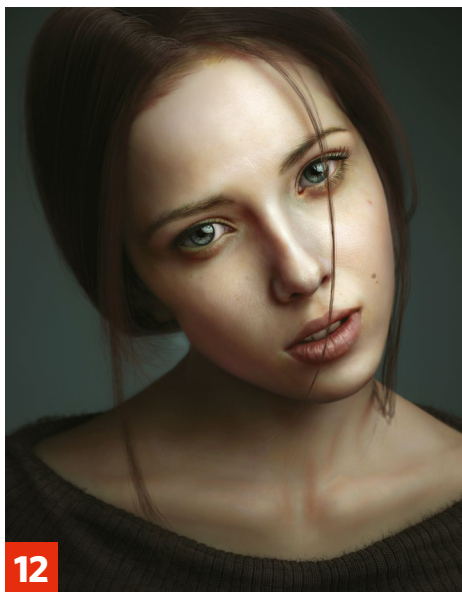
Even if the main mesh is exported from Marvelous, there is bunch of work still needed to be done inside ZBrush. ZRemesh the mesh from Marvelous and then project all the details on top of the new mesh. Once you are done, it's time to move onto the memory folds and details of the garment.

USING TEXTURINGXYZ DISPLACEMENT MAPS FOR HIGH FREQUENCY DETAILS

Overall, it is better to use the maps from www.texturing.xyz, as they provide enough details and complexity for most of the face microporosity. Don't forget that those maps are just a starting point - it is always better to add more porosity and details in a separated layer in ZBrush.

MEMORY FOLDS

With the help of Alphas and the Standard brush I created all folds that tell the story of the coat. It is important to pay attention to this step, as it's going to give extra details later during the texture process, especially if you use Substance Painter. All this information is gathered on the baked maps.



12 DISPLACEMENT MAPPING

I really like the Displacement method because you can quickly add details to simple geometry and create amazing-looking 3D. I mostly use this technique on concept designs with super-short deadlines when I don't have time to create really detailed models. For this exercise, I'm using a simple sphere with no UVMAP yet. Create the UVs by selecting ZPlugin>UV Master>Unwrap. Creating UVs is mandatory, as it's really useful to have the correct UV because the Displacement map will follow your UV coordinates and normals.

Once you've UVed your sphere, head to Tool>Surface>Noise. We'll use this basic input to import our Displacement map. Now switch from 3D to UV to tell ZBrush to follow your UV coordinates (button on the top) and then click on Alpha On/Off on the lower left windows and to load your Displacement map.

Once your Displacement map is loaded, you won't see anything at first – it's because you need to set the Mix Basic Noise setting to 0 and if your mesh is looking weird, invert Normal by pressing the H button. You can now play with the Strength settings to see your model getting details from the Displacement map.

Just press OK and make a quick render using BPR engine. You will now have a detailed render, but if you turn the model around, it will still look flat. To export it as a complete object with the Displacement map affected (baking everything), go to Geometry>Convert BPR to GEO and it'll bake everything into the model.

Antoine Collignon

12 UV MASTER MAPS

The UV Master plugin is a great and fast way to create an automatic pack UV of all models. I consider it a great tool to automate the creation of UV layouts for my objects. The first step is to create a blockout of the

face in 3ds Max. Then using the GoZ, the system that creates a dialogue between ZBrush and 3ds Max, I imported the geometry.

Before you split and carve the advanced details, generate the UV coordinates of the 3D models with UV Master. With it I can get the automatic unwrap of my 3D models in a few clicks, defining where to place the cutting points and organise the UV layout of the mesh relatively quickly. UV Master has a simple and easy interface that guesses properties and lets you see the unfolding of a mesh in real-time. You can also directly edit the UV pack of geometry through conventional instruments: move, rotate and scale.

With UV Master it is also possible to decide whether to import the existing UV coordinates or whether it is preferable to select edges where you want to cut geometry directly. But one of the main characteristics of the tool that makes it unique compared to other UV management software is that it allows you to do a colour painting to define the geometry of the mesh areas that need to be given greater importance in terms of exploiting the used UV space in the layout.

Pasquale Giacobelli

13 FIBERMESH BEST PRACTICES

FiberMesh is one of those tools that can be amazing – if used correctly – or very frustrating if you don't know how to set it up. Fortunately, there are a few very easy things you can do to avoid hiccups when working with FiberMesh in ZBrush.

Polygroup planning is very important and gives you more control over FiberMesh, especially if you generate large portions of fibres with different overall lengths.

Once the FiberMesh is created, it will keep the Polygroups of the underlying geometry that it was created from. This is incredibly useful when enabling the Mask By Polygroup switch on your brushes, from the Modifiers subpalette. With this initial setup and brush settings, you'll only affect the Polygroup you touch first, with the selected brush of your choice.

You can actually work with any of the ZBrush brushes on FiberMesh. However, the Grooming brushes provide a more specialised tool to handle the generated FiberMesh. What's even more useful is that you can alter those brushes to change the way they work. There is a whole subpalette, under the Brush Modifiers, dedicated to fine-tuning brushes for FiberMesh.

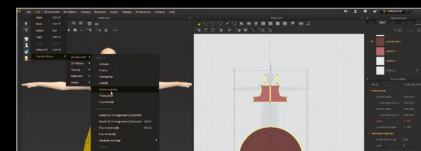
Just be mindful that when you use something like the Slice curve, the topology of the fibres will change and they will start behaving just like any other polymesh.

Since the FiberMesh is actually real geometry, you can create a new layer before you start grooming. Once you're finished, you can go back and play with the Layer slider to reduce or increase the effect.

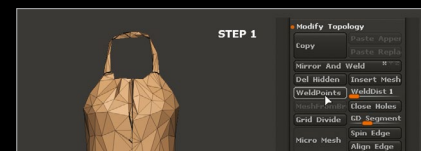
Pablo Muñoz Gomez

14 NANOMESH CLOTHING

Travis Davids teaches us to create abstract garments with NanoMesh and ZModeler



01 Quadrangulate garment Once you have created your garment in Marvelous Designer, it is important to keep the Particle Distance high – 20 should be fine. Quadrangulate the garment by going to Edit>Context Menu>3D Garment>Quadrangulate. Quads will be useful with NanoMesh. Now export your garment.



02 Weld points It is important to Weld Points before we decimate to prevent the garment from breaking apart. Go to Geometry>Modify Topology and simply click on Weld Points. Now go to ZPlugin>Decimation Master>Pre-process Current>Decimate Current. The lower the percentage of the decimation the bigger the triangles.



03 Use ZModeler to add detail To get the triangles to stand out, go to ZModeler and inset all polygons. Now go to Extrude and select Polygon All and extrude on the new Polygroup created. Extrude the amount slightly and the triangles will be more prominent. Smooth some of these triangles to get interesting results.



04 Explore further ideas using NanoMesh The reason for quads earlier is going to be useful with NanoMesh. Import your garment and only Weld Points. Now use NanoMesh to distribute geometry on all of the quads. I used a simple cube and adjusted values to get abstract results that still follow the form of the garment.





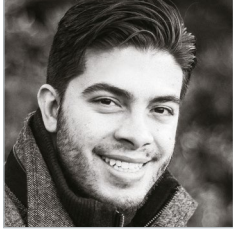
Master hair & fur in ZBrush

Based on a 3D mesh and rendered in passes for compositing, this striking wolf defiantly stares down the viewer

With each step of the following tutorial, we'll take a look at the various processes involved in the creation of the Alpha wolf illustration. The approach will be methodical and we'll try to sculpt the 3D elements with the end goal in mind, to save time and optimise resources.

The creation process will start with the understanding of a few key points of the wolf's anatomy, so that we can exaggerate them in order to make the illustration more interesting. There are a few important elements in the composition such as the pose, expression and camera position. We'll try to keep these key elements in mind during the sculpting and grooming stages, so that each part contributes to the final image.

The majority of this tutorial will be done in ZBrush, but we'll use Photoshop for compositing the various render passes. FiberMesh is an essential feature for the creation of the wolf's fur, so we'll spend some extra time during this stage of the process in order to get it right.



PABLO MUÑOZ GÓMEZ

The Alpha, 2016

Software

ZBrush, Photoshop

Learn how to

- Create a base mesh
- Optimise fur with mesh sculpting
- Experiment with retopology and projection
- Use polygroup planning
- Use polypaint and texturing
- Create effective poses
- Create and groom fur
- Optimise fur for rendering
- Render and composite

Concept

The idea was to capture a growling wolf with a defiant posture. This meant creating a scene that implicitly involved the viewer and illustrating a palpable moment of tension where the next action could be decisive.

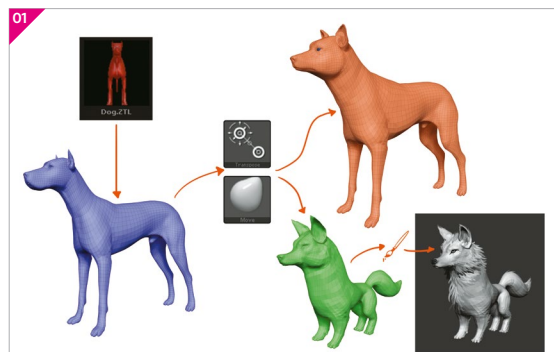
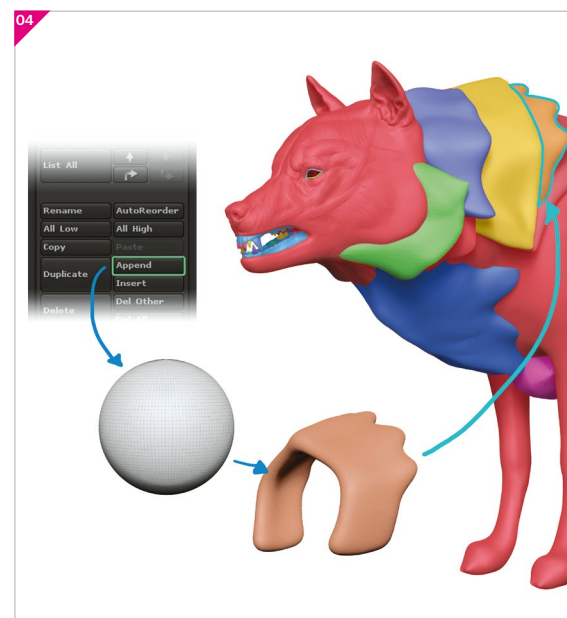
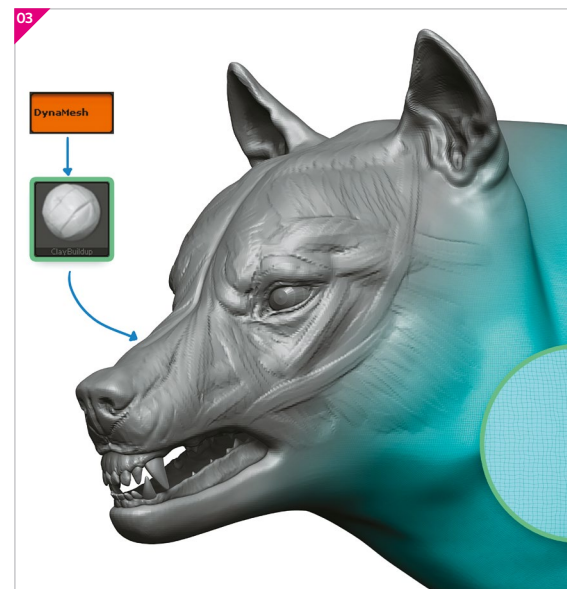
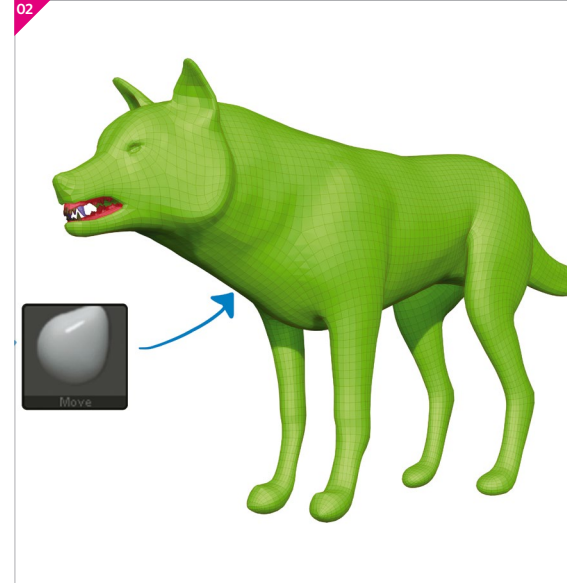


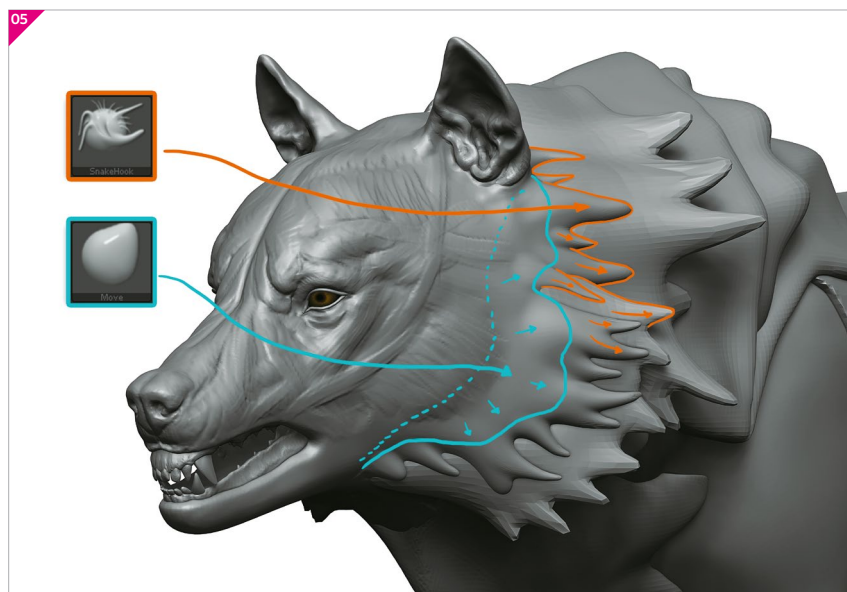
01 Identify the wolf's features For your references, try to collect things that are informative but also inspiring. A wolf's anatomy is almost identical to that of a dog, but after some research you can start to see the little differences that give wolves that stylised uniqueness. If you know the differences between dogs and wolves, you can start your 3D mesh with a generic model of a dog (like the Dog.ZTL tool that comes with ZBrush) and tailor it to work as the base for the sculpture of your wolf. As a warm up, you could take on the challenge of sculpting a cartoonish version of the wolf. This is a fantastic way to learn and recognise the main features of a wolf. This exercise will build on strong elements that will help to identify your creation as a wolf and not a dog.

02 Prepare the first base mesh When playing with proportions, there is a lot you can do without adding more geometry. In the previous step, the cartoonish version of the wolf has the same topology as the generic Dog.ZTL. It resulted from moving and smoothing areas. Similarly, you can create a precise base mesh that describes the volumes of your wolf. You can gradually start subdividing the geometry later, when more details are required. In this case, we are taking the existing topology of the Dog.ZTL and using the Move brush and Transpose line with masks to alter the proportions and shape the model like a wolf. Don't worry too much about the polygon distribution, as this isn't the final base mesh.

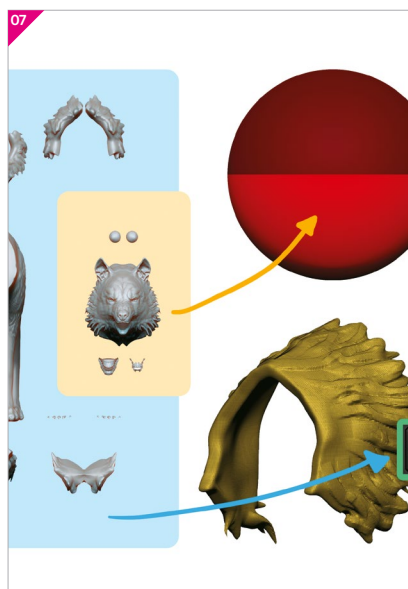
03 Sketch over the base mesh As mentioned, you could have started with a precise base mesh and subdivided it as you need to add more details. However, in this case we'll turn the current base into DynaMesh by enabling this feature from the Geometry palette. You can tweak the resolution slider to get more or fewer polygons to work with, and hold the Ctrl key and click+drag anywhere in the canvas to re-DynaMesh. With DynaMesh on, we can take the ClayBuildup brush and add some marks to establish a few anatomical anchor points. These will be helpful when sculpting the expression and other parts of the wolf's body.

04 The key for the hair We are still early in the sculpting process but this is where the foundations are laid. One of the most distinguishing aspects of wolves is the fur, and the intricate variations in its length and colour. We are going to fake these variations a bit, and sculpt some layers of fur with only geometry. This is a simple way to optimise the amount of fur for render time. You could insert a sphere and shape it, or use the geometry brush to create some planes over the model and then extrude them with ZModeler. In this case we are going to append a sphere from the SubTool palette so that each part of the 'fur' base mesh is a separate SubTool.





05 Refine the fur geometry layers These additional SubTools, or pieces of geometry, are there to simulate the volume of the fur. They will also serve as a rough platform to groom the hair and pull it in a particular direction. A key aspect of making the plates of geometry useful is to integrate them with the main model, so that they follow a unified direction, and to ensure that the transition between pieces is not abrupt. A very cool trick is to use the SnakeHook brush, and hold the 'Alt' key while pulling an area. This will make the geometry you are pulling follow the adjacent geometry.



06 Sculpt the fur with geometry At this point, we have a good foundation for the hair and the model is beginning to look more like a wolf. We can now go further and sculpt big chunks of fur in the geometry, like clumps of hair. This will give us an interesting look when grooming. We can make the fibres from FiberMesh grow perpendicular from the normals of the polygon. So, when groomed, these fibres will give us the effect of having more individual hairs under the surface, as the indentation will seem fuller. You can use the ClayBuildup and Smooth brushes to sculpt the chunks of hairs on the SubTools. The SnakeHook brush will help you achieve those long hairs transitioning between SubTools.

07 Retopologise Once the sculpt is done, we're going to create a cleaner topology and transfer the details. We can approach the retopology process in a few ways for this particular project:

- Leave all the current SubTools on and create a single mesh for the entire model. We can split it up later and we'll end up with a more fluid topology.
- Retopologise every single SubTool individually and have a bit more control over each part.
- Manually retopologise the most important parts and use a quick ZRemesh for everything else.

We'll go for the third option as this will end up being an illustration and we won't need to animate the wolf.



08 Use manual and automatic topology Go ahead and append a ZSphere as a new SubTool and enable 'Edit Topology' from the Topology sub-palette. It is also a good idea to enable symmetry ('X' on your keyboard) before you start. This process might be lengthy and requires patience. Start drawing points along the head of the model to create a cleaner topology. For the rest of the body, we'll use the ZRemesh under the Geometry sub-palette. You can play with the 'Target Polygons Count' slider if you need to adjust the number of polygons created in this process.

Sculpting from references

If you are trying to match a specific reference like an expression that you really like, avoid sculpting with the perspective on. And, if possible, find out the camera lens that was used for the photo reference you liked so you can roughly match the 'Angle of view' in ZBrush (from the Draw palette).

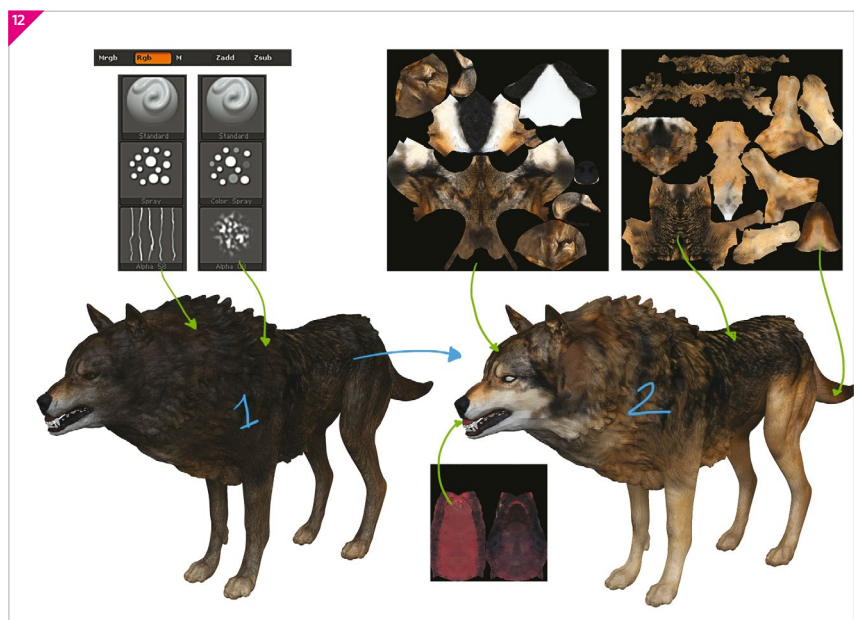
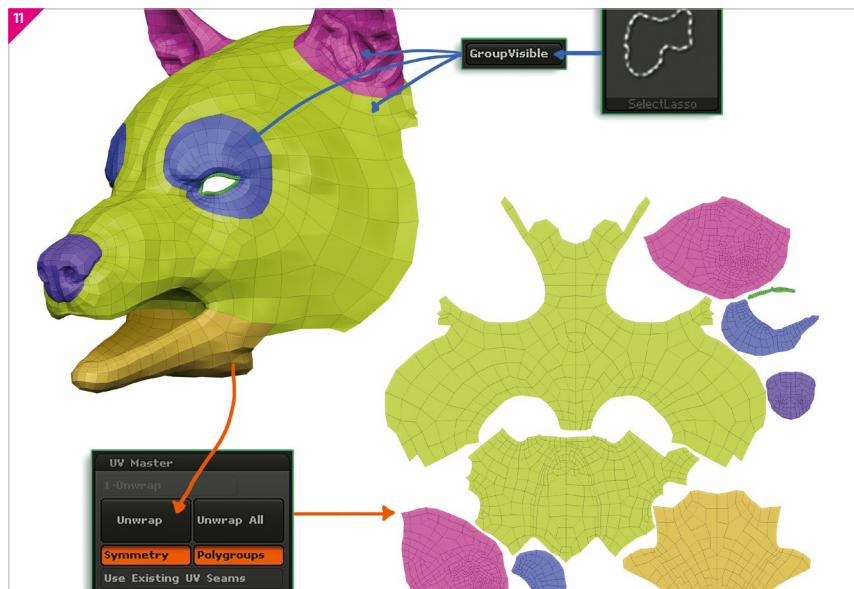
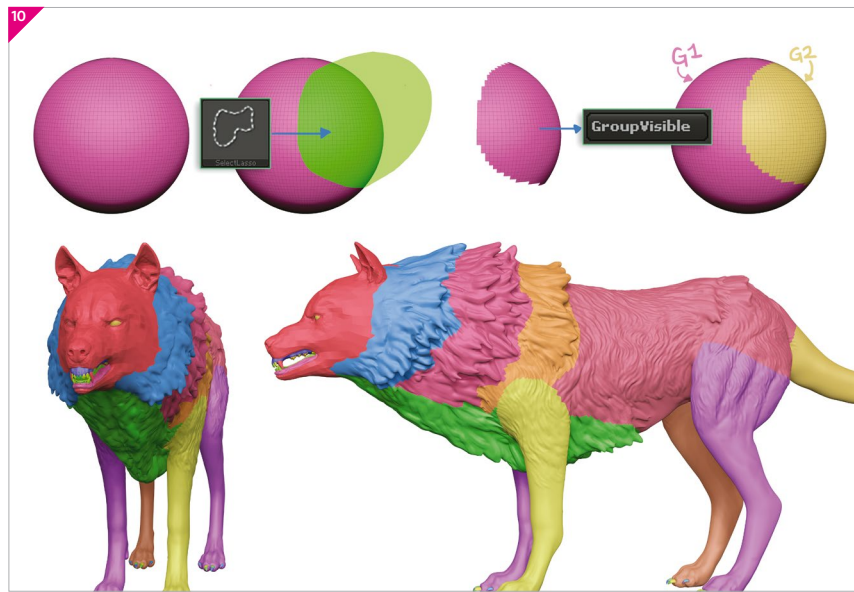
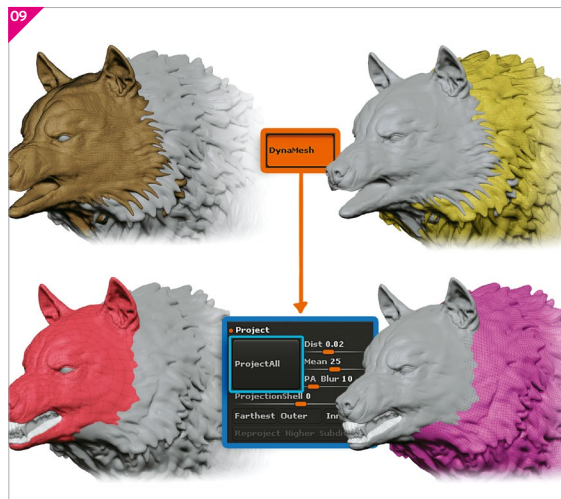
Also, if you are limited to working with just one monitor, you can make a single collage image in Photoshop and import it as an image plane into ZBrush. This way you can have your references always on hand as a background when sculpting.

09 Transfer details Now that we have a cleaner topology, we can transfer the details we sketched on our DynaMesh model into a subdivided version of the new model. Subdivide the newly created topology a couple of times, to have enough resolution to capture the details. Select the new mesh, make sure the sketched model is visible and click on the 'Project All' button under the SubTool palette. Once the details are projected, you can spend a couple of minutes cleaning up any imperfections resulting from this process and simply turning off the visibility of the sketch mesh (it is a good idea to keep a backup).

10 Cut up the model Now we are going to split up the model to work faster and more efficiently (this is very important once we start working with the fur). Since we chose to create a SubTool for the head alone, we already have it as a separate piece. The rest of the body, however, is one single piece. The head will be a fundamental part of the final illustration, so grouping it, will give us much more control. It is also helpful to keep the body separate from the legs and tail but you can leave the rest of the body as a whole and polygroup the other areas after. You can use the Lasso selection tool to hide parts on of the model and use Ctrl+W to assign a polygroup. Or use the 'Split hidden' button from the SubTool palette to create a new SubTool.

11 Create UVs Before creating the UVs, we're going to create some more polygroups around the face. The idea is to create groups that allow you to quickly select certain groups of hairs for easy grooming. We'll create polygroups for the ears, around the eyes, eyelids, nose and jaw. Once we're done with the polygroups, we can use the UV Master plugin to generate clean UVs for the model. For this particular tutorial, perfect UVs are not essential, but they let us transfer polypaint data to texture and save them as images.

12 Quickly texture Now that we have UVs, we can add some colour to the wolf. The wolf in this tutorial will be a dark brown/black wolf, but painting the underlying geometry with more tones will make it look more interesting. We'll cover everything with fur, so the texturing job doesn't have to be precise. Import a few reference images from the Texture palette and add them to Lightbox. Using the Standard brush with only RGB enabled, roughly texture the model using your reference photos that match different parts of the body.





Splitting versus grouping

Splitting up your model could be beneficial in many ways. With multiple parts you can achieve a higher level of detail and work faster since you can turn the various parts on or off. Grouping is also very helpful in order to create selections and quickly hide parts of your model. For the purposes of this tutorial, we don't need to split the wolf up much as the details will be defined by the fur, not in the sculpted geometry itself.

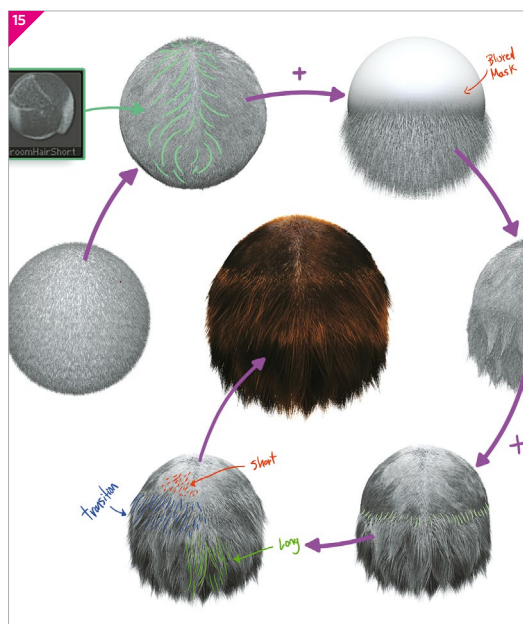
13 Choose a pose Time to pose your model. Here is where you can give character to your wolf and add dynamism to your illustration. Wolves use a variety of complex non-vocal communications to express submission or dominance. To create tension, we'll put the wolf in a threatening pose: teeth bared and lips curled, horizontal ears pointing outwards. The straight tail and lower head posture could signify hunting or intention to attack. To achieve all this, we can use Transpose Master to move all the parts into place. The Move Topological brush is also very helpful to fix tight areas.

14 Create fur We need to create the fur after the model is posed, otherwise posing the wolf with fur would be an incredibly difficult job. We'll create various groups of fur for the various sections of the wolf depending on the length. However, the process is the same for each part:

- Mask the area (and blur for smoother transitions).
- Preview FiberMesh, adjust if necessary and create fibres.
- Use the Move brush to move large areas into place.
- Use the Groom brushes to create the flow of the hairs.
- Use BPR to check progress, groom and move hairs further if necessary.

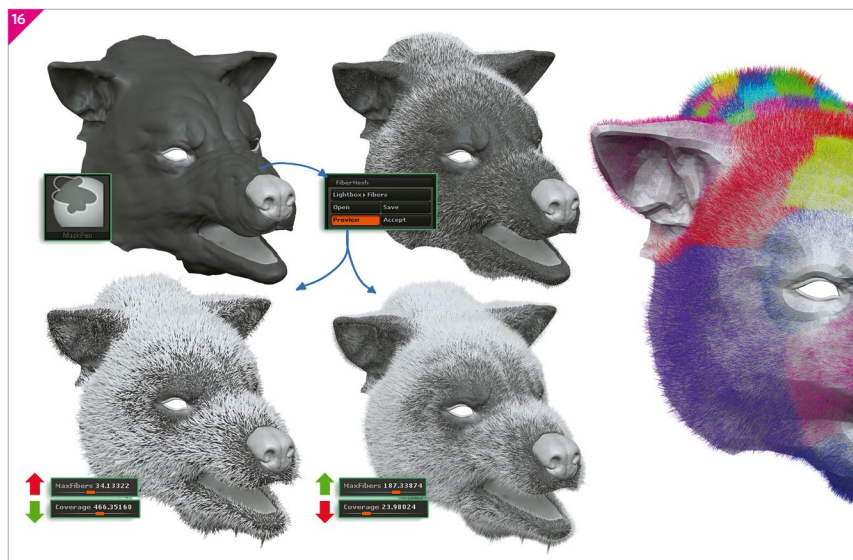
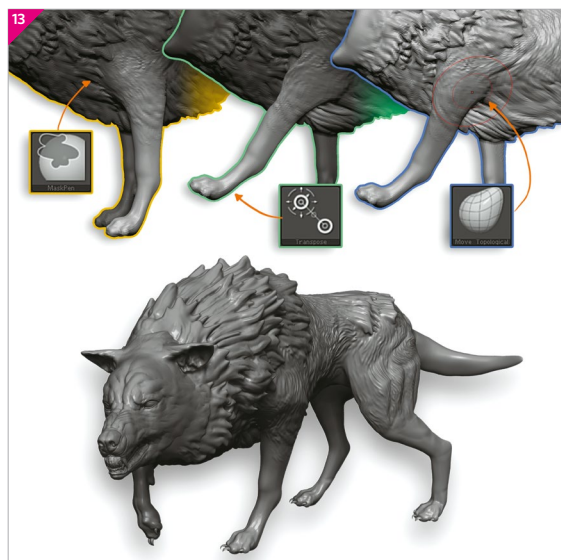
15 Create fur transitions Creating a natural transition between the different lengths and sections of the wolf is very important for a believable effect. The easiest way is to create three sets of fur per section that require transitioning: the short hair section, the long hair section, and the transition hair that bleeds into the short and long sections. We can use any of the grooming brushes to tweak and shape the fur. Since we also have polygroups, you can turn the Mask By Polygroups slider to 100 under the Auto Masking options of the brush to affect them individually.

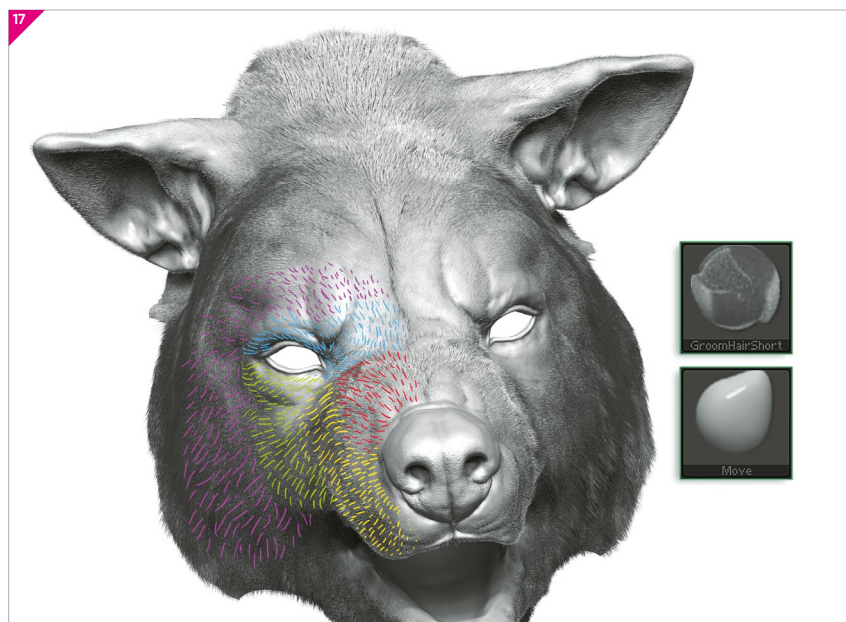
16 Grow the fur We'll start with the head. With the head selected, turn on solo mode to work faster. Use the Masking brush to select the areas you want grow the fur (avoiding eyelids and inner mouth). From the FiberMesh palette, turn on 'Preview' and use the modifiers to tweak the look of your fibres. The trick here is to keep the MaxFibers slider low and compensate a bit with the Coverage slider. Use the PBR button to test the FiberMesh and click on Accept once you are happy with the result.



Posing and asymmetry

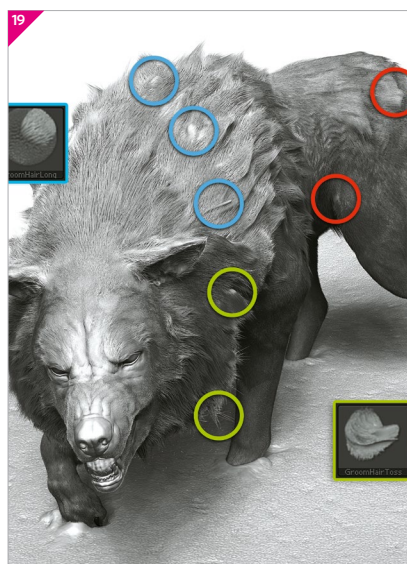
A very distinctive way to create realism is to have asymmetry in your model. If you have been sculpting with symmetry enabled, the posing stage is a great opportunity to create those subtleties. A great deal of the asymmetry in the wolf will be given by the fur, because we will create and groom the hair with the wolf already posed. Another chance to create subtle asymmetry is when texturing and polypainting the model.





17 Groom the fur Select the GroomHairShort brush to give direction to the hairs. It is a good idea to refer back to the photos you've collected throughout your planning stage to check the hair's natural flow. Remember that the fibres are just polygons so you can use any of the sculpting brushes to tweak them. The Move brush is particularly handy to readjust the position of large areas of hair. Try to get the direction of the hair in one stroke. Going over the same area multiple times might twist the fibres and end up giving you some undesired rendering effects.

18 Grow long hairs For the longer pieces of hair, we are going to create a more blurred mask on the mesh. This will help us with the transition from short to long fibres. You can play with the 'ByMask' modifier slider if you want to tweak the mask priority. Try to keep a low number in the 'MaxFibers' slider. The idea is that the sculpted chunks of hair will give us the structure and direction of the fur and we'll only use FiberMesh to cover the 'spike' of geometry to complete the effect. If you find a few 'bald' spots after generating the fibres, you can cover them later with transition hairs using a very soft mask and low count of fibres.



19 Complete the final grooming and tweaks At this point the hard work is almost finished. We can go over the areas with longer hairs and use a custom version of the GroomSpike brush in order to clump some hairs together. Expand the Brush palette and under the Twist options, change the Twist Rate and the Radius sliders to 0. You can also reduce the Z intensity a bit to have more control. With this custom brush you can pull some long hairs together, especially around the cheeks, neck and chest of the wolf. An additional trick is to use the GroomTurbulence brush with a very low Z intensity (say 5) and go over the entire model to give it a more natural 'messy' look.

20 Finish with BPR passes and compositing Once you are happy with the wolf model (and the fur), you can choose a camera angle to start the rendering process. The most important step before you start your renders is to set the document size and save your camera angle (from Document > Zaplink properties). You can render as many passes as you need for the compositing but there are a few which are essential: a Colour or beauty pass, a Shadow pass, ZDepth, Alpha and any light passes. Other passes such as AO might be helpful but they're not essential. Save the BPR passes as PSD files from the BPR Renderpass palette and drop them into Photoshop as individual layers. For this illustration a ground plane was quickly sculpted and added before rendering to make the compositing a bit easier. The background is a series of painted layers, blurred at different values to simulate the depth of field.



Painting fibres from texture

You can colour the FiberMesh based on the textures used on the underlying geometry. All you need to do is set the BColour to 1 and the TColour to 0 under Modifiers in the FiberMesh palette. After creating the fibres, you can use the Masking by Fibers feature under the Masking palette to manually paint just the tips of the fibres and neutralise the colour variations.

Light a cinematic scene in Unreal

Learn how to create and finalise a cinematic look and feel to your Unreal Engine 4 environments

Here we will discuss how to create mood and visual storytelling in UE4. Understanding how to craft a visual style and story can help you to create intense moods or to provoke a particular emotion from the viewer.

We will look at creating key visual story elements in the scene to help establish lighting, history, time, place, wear, damage and other characteristics. In order to make an impact on viewers, visual artists need to be able to establish a visual background story. Knowledge of the elements that help craft this story is important for any visual artists wanting to impact the viewer.

We will also examine the use of post-processing settings in Unreal to achieve mood through colour and value. Using Photoshop to process our image and establishing a lookup table (LUT) will help to form the colour palette for our whole scene, with a focus on custom shadow and highlight colours.



WASH





CLINTON CRUMPLER

Kingwash Laundromat, 2016

Software

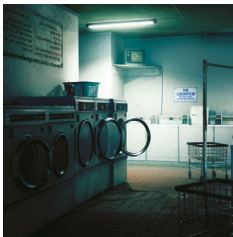
Unreal Engine 4, Photoshop

Learn how to

- Look develop a scene
- Develop for games
- Light a scene well
- Post-process
- Edit photos
- Texture assets
- Perform colour correction
- Master cinematography
- Create environment art

Concept

This piece was inspired by a collection of night-time photographs of Nineties neon signs, old city buildings, hotels and gas stations, as well as a colour composition consistent with horror films from the late Eighties and early Nineties.



01 Establish the camera's view When creating a foundation for your mood and story, perspective is key to getting the right viewpoint. Try to think about where and how the viewer sees the scene. Are they right in the thick of things, seeing the view in a first-person perspective, or are they a distant viewer watching from the outside? Is the gameplay third person or first person? You will need to understand their perspective in order to create mood and ambience. It will also help you to tailor your scene and decide on level of asset detail.

02 Test multiple camera key shots Place a few camera actors in your scene to establish a couple of key shots. Find what you want to focus on and what areas you want your viewer to see (or not see). Sometimes, alluding to more information off-camera can establish a mystery to be discovered and can provide much more visual interest and depth to your composition. Looking at the same area with a different perspective through the camera's view can provide you with a radically better composition. You can take direct view of a camera placed in the scene by Ctrl/right-clicking it and selecting Pilot Camera.

03 Change the aspect ratio and FOV When using the camera settings, you will find that increasing your aspect ratio to 2 or higher and lowering the default field of view from 90 to a value between 50 and 80 will provide a more realistic and cinematic look. This is different than what a player will typically use in a gameplay mode, but it provides a less distorted perspective of the environment for cutscenes and portfolio work.

04 Add life into the scene Real-time animation and dynamic changes in your scene can also provide clues about what's happening. Moving flags, flickering lights and neons, and animated monitors, for example, can all sell different ideas and themes. Using simple material tricks, such as vertex offset and emissive changes, can often provide big visual impact at a small cost.



Add in narrative clues

Consider diversifying the visuals in your scene to help tell a story or give context. For example, currency and technology can always help reveal the year and setting. Using time and place gives viewers context as to why the scene looks the way it does, what year it is and in what country or location the scene is set. Signage or notes can be a more definitive way of establishing setting, but making use of more subtle context clues rewards the viewer more for paying attention to details in the scene. These types of visual easter eggs can engage the viewer to look for more hidden meaning.





05 Use varying material types Try varying the types of surfaces in your scene. The newest games, using a PBR workflow, utilise all bells and whistles to make their visuals look good. Using various types of materials, such as metals, plastics, wood, concrete, plaster, ceramic and others, can help to sell the believability of the scene, illustrating the different ways the light plays off each surface.

06 Work with lighting before post-processing It can sometimes be hard to wait until the end of your design to begin working with post-processing in Unreal, but delaying it will prevent it from muddling your final results. Work with lighting first and then do test builds to make sure you have a good composition and range of contrast values throughout your scene before moving on. Post-processing should strictly be the icing on the cake, not a device used to cover up a hastily made environment.

07 Establish a colour palette List out all the films or other visual media you have seen that have a similar context and feel to that which you want to create. Pull a frame from a film or game that inspires you and use a basic Gaussian Blur on the image in Photoshop until there are a few colours remaining. Doing so provides a good framework for your colour palette. You can then use this palette to establish everything in the scene from the paint on the wall to the colour of the lighting.



Disable Auto Exposure for ease of use

When setting up lights, it's a good idea to place a Post Process Volume within the scene. With the Volume selected, enabling Unbound in its details will allow it to affect not only the Volume, but also the whole scene. Then in the settings, turn both the Min and Max Brightness of the Auto Exposure to 1. This setting disables the feature and keeps the light from auto adjusting against the brightness of the scene, and provides you a more consistent view of your lighting.

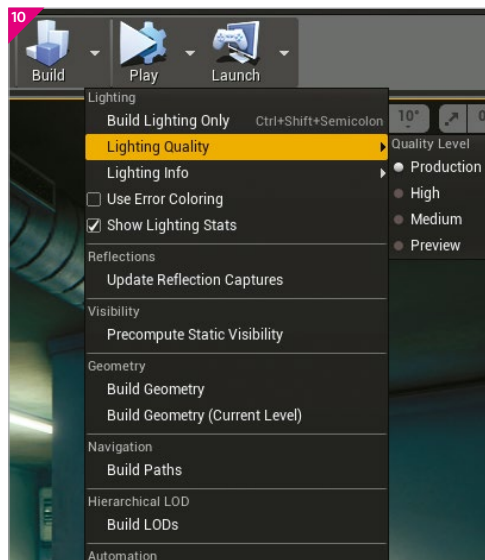
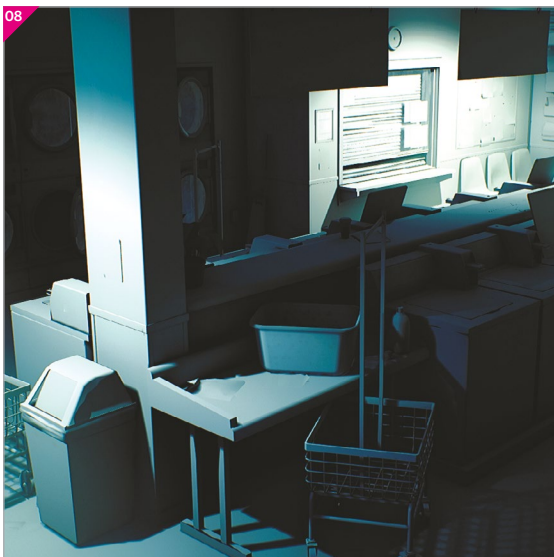


08 Define the space with lighting Lighting is sometimes an underused tool for environment artists, but it can be your biggest ally. Let the lighting help define the space. Be sure to allow each light in your scene to breathe, with enough space to see breaks or rests in high and low-contrast values. Try testing with Lighting Only mode or Detail Lighting to see the best results. Shape your assets and props with framing lights to push the sense of 3D space. You can change to Detail Lighting or Lighting Only under the View Modes options.

09 Establish visual priority When placing lights, use the overall lighting value to define importance within any given shot. Using a range from brightest to weakest to establish visual priority or inverting light colours compared to your overall scene will provide focus to the viewer. For instance, if your scene is cool-coloured, try a warm light to draw more attention. Then you can cool the less important lights to make them blend into the environment more. Volumetric effects and meshes around lights can also really draw attention from the viewer to add heavier feeling to the lit areas.

10 Bake lighting with Lightmass Do not forget to place and surround your scene with a Lightmass volume. Doing so allows the light bake to compute properly for all the assets and actors contained within the volume. Also, when baking and building lighting for your scene, start with lower-quality settings of preview. This view speeds lighting production time and allows for quicker iterations and faster results. For the best results, make sure to use production-quality lighting at the end.

11 Work with Stationary Lights Using lights to highlight material attributes will breathe life into your scene. A baked lighting scene using only point lights can sometimes begin to look flat once the scene is built and baked. Stationary Lights include features from both static and dynamic lights that provide for interesting lighting options. Sometimes, when using a Stationary Light, you can create nice glints on surfaces and materials that bounce light to provide more visual interest. Another tactic is to face the light towards the camera at an acute angle to provide a nice reflection from the camera's perspective. Remember to tweak the Shadow Bias and Filter Sharpen for good contact shadows.



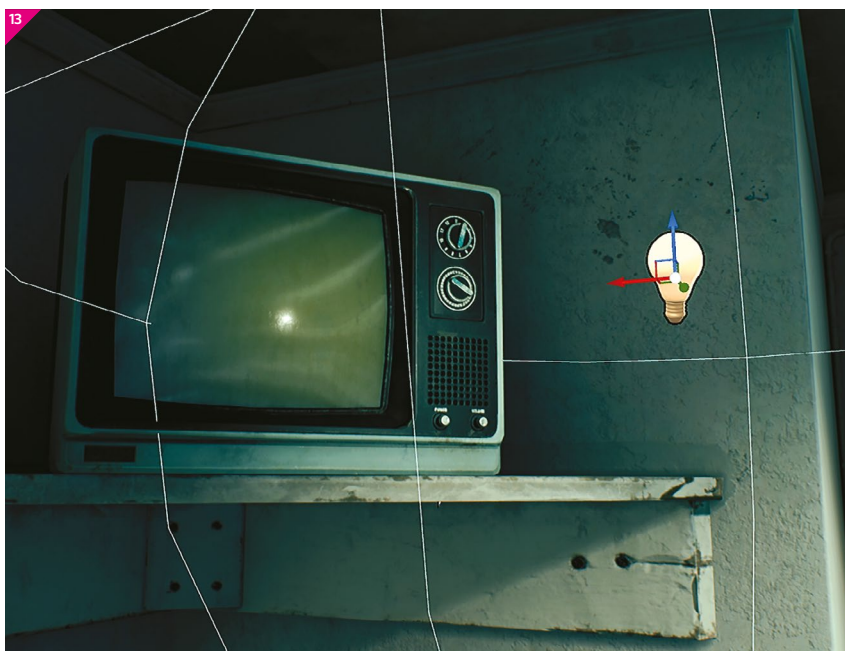
Add in fog effects

Fog is a very easy tool to use, and includes some really nice features. Fog can even help lift some of the darkest areas in your scene into a more readable state. Also, fog can help provide a sense of depth and distance between objects within the environment. Adding a bit of colour to the fog can give clues to time of day and overall atmosphere. Be careful not to use too much fog, as it can quickly flatten or remove all the contrast you have worked so hard to create!





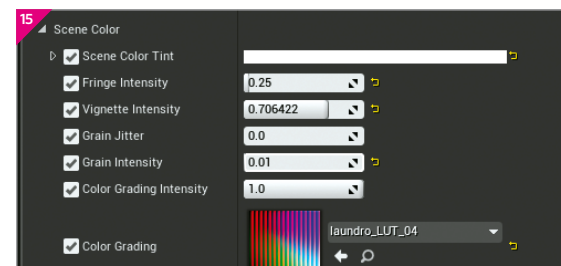
12 Check the scene's values Try to keep your scene's light and dark values from hitting the extremes. Avoid pure black shadows or pure white lighting. This not only allows more visibility in your scene, but also allows for more control when altering contrast or colours during the post-processing stages. Using the Post Process Volume in your scene, you can simply reduce the Saturation to 0, which allows you to easily see all values across the environment.



13 Add lights to taste While setting up lighting, for a darker-style room like this one you may have areas of your scene that are too dark to read. While contrast is nice, try to keep most your lighting values balanced by adding fill lights to suit your visual taste. If you keep them small and with a softer falloff with their aim pointing from the direction of a light source, generally the visual will hold up and the mind's eye will fill in the blanks that the light must be coming from one of the main lights in the scene.

14 Work in small increments Once you begin working with the Post Process Volume, remember to make small changes at a time. Almost all of the controls in this Volume can have a dramatic impact on the overall visual for your scene. Take and save screenshots, and make notes of the changes made to achieve the look throughout the process. Oftentimes, you may realise that you have gone too far or prefer an earlier look. Maintaining history on your various looks can make it much easier to get back and also help you to understand the settings for the next time you create a scene and use the Post Process Volume.

15 Add scene colour options Some of the quickest wins for Post Process Volumes are in the settings under the Scene Color options. Scene Color Tint, Vignetting, Fringe, and Grain can all make nice additions to the scene. Remember to use these in moderation, as they can quickly overpower and cheapen the look of your environment. I recommend a value of no greater than 0.5 for the Fringe or the Vignette Intensity, depending on the mood you are trying to achieve. This will add just a touch of camera effects for a more cinematic look.



Keep post work non-destructive

While creating a LUT, it is easiest to take a simple screenshot of your scene in Unreal and then drop this image into Photoshop. Then use layer adjustments with Curves, Levels and so on to keep your work non-destructive. Doing so allows you to keep your edits changeable at any time and enables you to simply drag and drop these adjustment layers into other Photoshop files with the Unreal LUT texture for finalisation, export from Photoshop and import into Unreal.

16 Create and use a look up table (LUT) Look up tables are one of the most efficient tools when working with post-processing. They can change the overall mood and look of a scene quickly along with using Photoshop tools to do it. Using the default LUT from the Unreal documentation, you can apply Levels, Curves, Filter, Contrast, Brightness and many other effects in Photoshop to alter the colour values throughout your scene. This should be left until very last, as it will change the colours and values of your scene from final tweaks.



17 Camera depth of field When setting up depth of field for your camera, using the newer 'CircleDOF' method can provide the most convincing and real-world camera. When using this method, the two most important controls in the post-process settings are the Aperture F-stop and the Focal Distance. The F-stop controls the amount of information entering the lens, while the focal distance controls how far your main point of focus is from the camera. Use Show>Visualize>Depth Of Field Layers to enable an Unreal view mode to pinpoint the exact distance of where you want to focus in the scene.

Showcase

Clinton Crumpler

Clinton is currently is a senior environment artist at The Coalition in Vancouver, having recently delivered *Gears Of War 4*. His primary focus is environment art, shader development and art direction. He has also released multiple video tutorials, articles and books.



Saigon Office, 2014 UE4, Maya, Photoshop, Quixel, ZBrush

This scene was created to establish a mood and look from the Vietnam War era. Colour tones and furniture design helped to shape the story.



2014 UE4, Maya, Photoshop, Quixel, ZBrush
A old Soviet-era bunker retro-fitted for current-day use. This scene was created as a technical showcase of cave construction.

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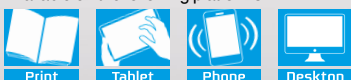
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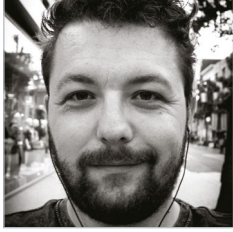




Composite Cycles render passes in After Effects

Use Adobe's tool to correctly composite in linear space and achieve stunning still life renders

This tutorial is about understanding Blender Cycles render engine passes and how to leverage compositing them together in After Effects for more flexibility in post-production. The guide takes you through the basics of multi-pass compositing. Learn about the benefits of working this way and gain an understanding of why this workflow can save you time in the long run when working on complex scenes.



MIDGE SINNAEVE
Still Life, 2017

Software

Blender, After Effects

Learn how to

- Use Cycles render passes
- Extract them in After Effects
- Composite them correctly in linear space
- Tweak your render using the passes
- Add post effects using the passes

Concept

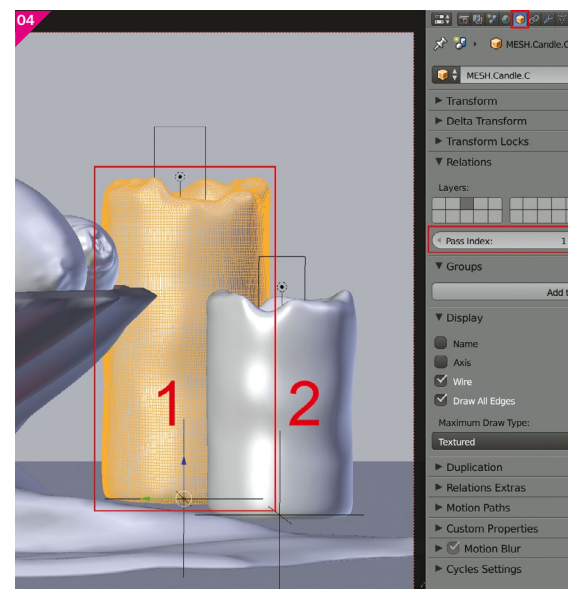
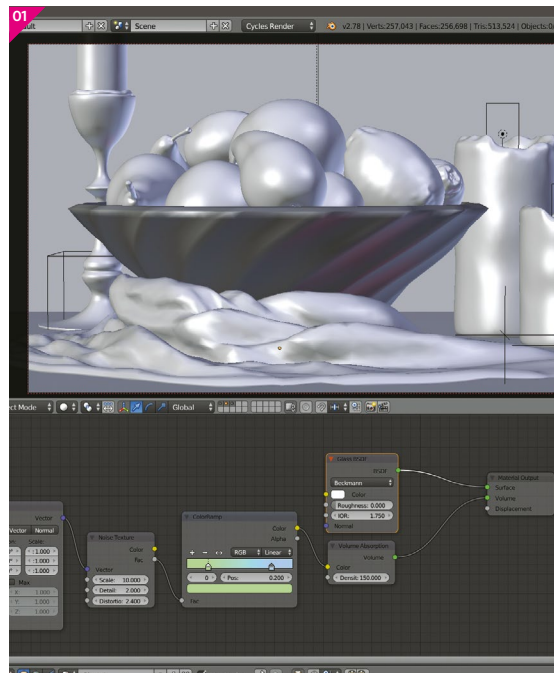
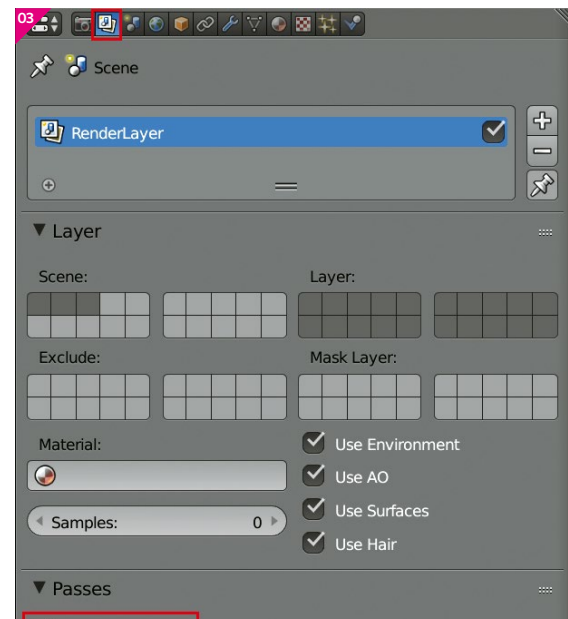
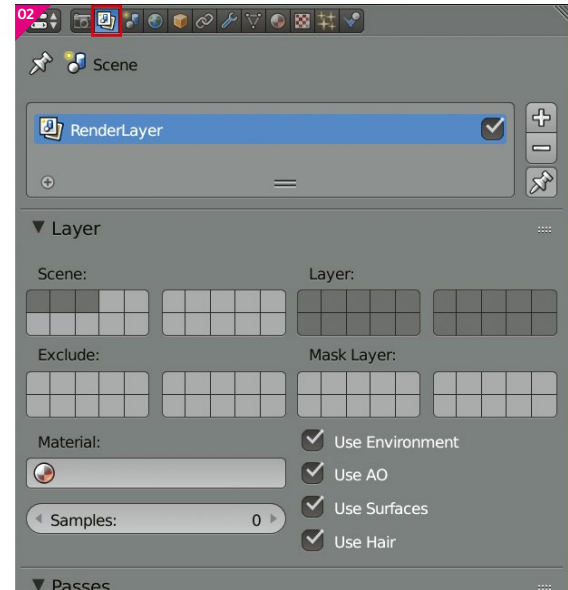
I created this scene to help you gain an understanding of how Blender Cycles's render passes work by going through the process of compositing them together correctly in After Effects. Learn about both the advantages and limitations of using render passes in your post-production work.

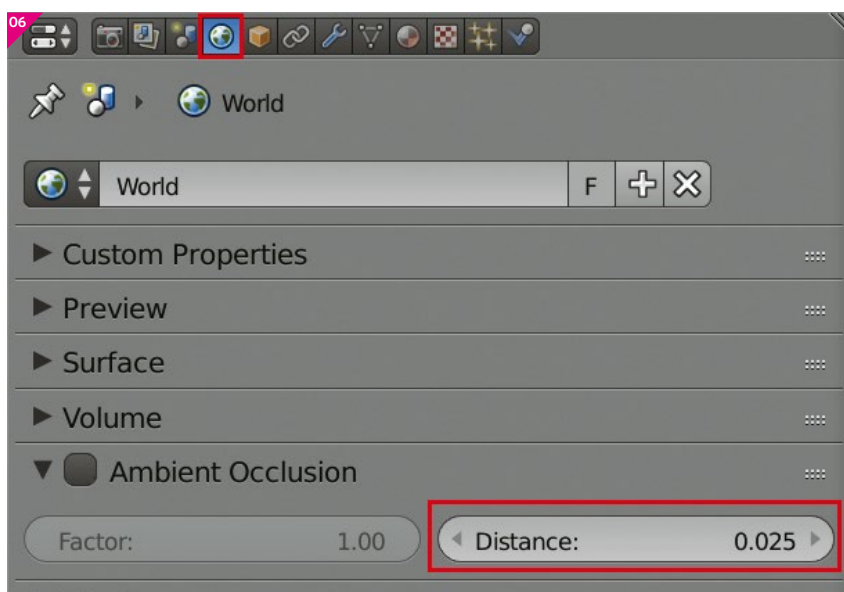
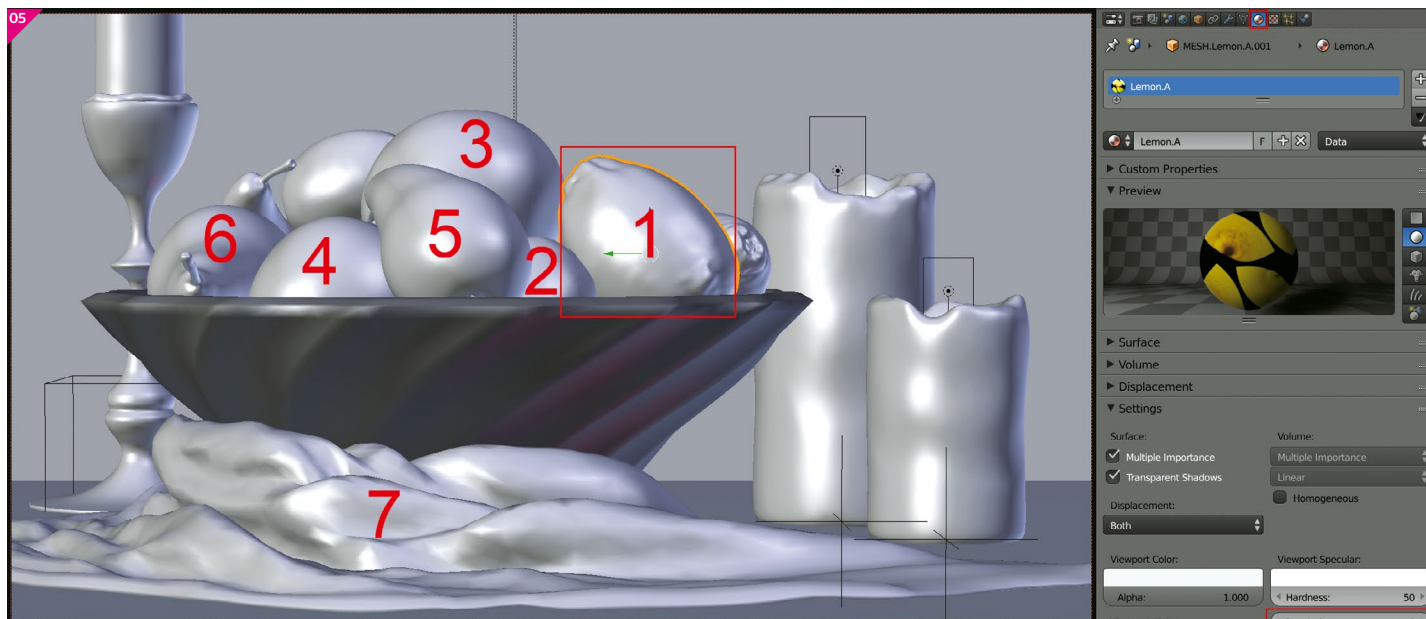
01 Analyse the scene Open up the provided C2AE-START.blend file to have a look at its contents. We'll use this scene as a jumping-off point to set up the Cycles passes we'll be using in After Effects. A final render has also been supplied to work with, so no rendering is required to complete the training. Take a moment to get acquainted with the Blender scene to be able to follow along easier.

02 Set up the passes In the Render Layers tab of the Properties window, there is a Passes section with all of the render passes Cycles is able to output. We'll start by selecting all 12 of the passes found under the Diffuse, Glossy, Transmission and Subsurface headings. Be sure to enable the Emission and Environment checkboxes as well. These passes contain all the information we need to re-create our image in After Effects.

03 Add any additional useful passes On the left of the passes there are a number of extra utility passes that can be added to a render. The Combined pass is enabled by default and is just the final render. Leave this pass in for later reference in After Effects. The others serve as tools to be used when you're compositing the render. For example, the Z pass can be used to add camera depth of field interactively in AE. Be sure to check the Z, Mist, Object Index, Material Index and AO passes respectively.

04 Object Index Some passes need additional setup in the scene, as is the case with the Object and Material Index passes. These serve as masks that can be used in compositing to tweak individual objects or materials. Starting with the Object Index, a unique number needs to be assigned to each object that a separate mask is wanted for. Do this by selecting an object and going to the Object tab, then changing the Pass Index under the Relations section. By default, all objects have an Index of 0, so make sure to have a unique value higher than 0 for each object that needs a mask. In this case the candle at the rear has an Index of 1 and the candle at the front has an Index of 2.





05 Material Index After setting up the Object indexes, it's time to do the same for the materials of the fruit in the scene. Each piece of the three types of fruit comes in two variants, so there are six materials total to set up masks for, as well as one for the velvet cloth. Start by selecting one of the lemons and going to the Material tab. In this example, MESH.Lemon.A.001 is selected. Under the Settings heading there is a Pass Index option, which will be changed to 1 for the first material (Lemon.A). Do the the same for each fruit variation and the piece of cloth and make sure to increase the Pass Index to a unique number for each material.

06 The Mist pass Other utility passes that need extra parameters are the Mist and AO passes. The Mist pass is generally used to add some atmosphere into the scene during compositing and as such needs to be set up to define the visible distance of the scene. The AO pass, on the other hand, can be used to add extra shadow-like detail. Both of these passes are set up in the World tab after enabling them. These values will be dependent on the size of the scene and will be different for every project. In this scene, setting the Mist to 1.0 and 2.0 and the AO to 0.025 produced the desirable effects. There's no need to check the Ambient Occlusion checkbox for it to be rendered to a separate pass.

07 Ready to render Before hitting the Render button, there's one last thing to set up. In order to have all the render passes available in the output file, it must be saved in the OpenEXR MultiLayer format. This ensures all the render passes are contained in one image file, so they can be extracted in AE later. The Float (Half) option has everything that's needed to store all of the information and doesn't take up as much space as the Full option. This can be set up in the Render tab.

Think about reflections

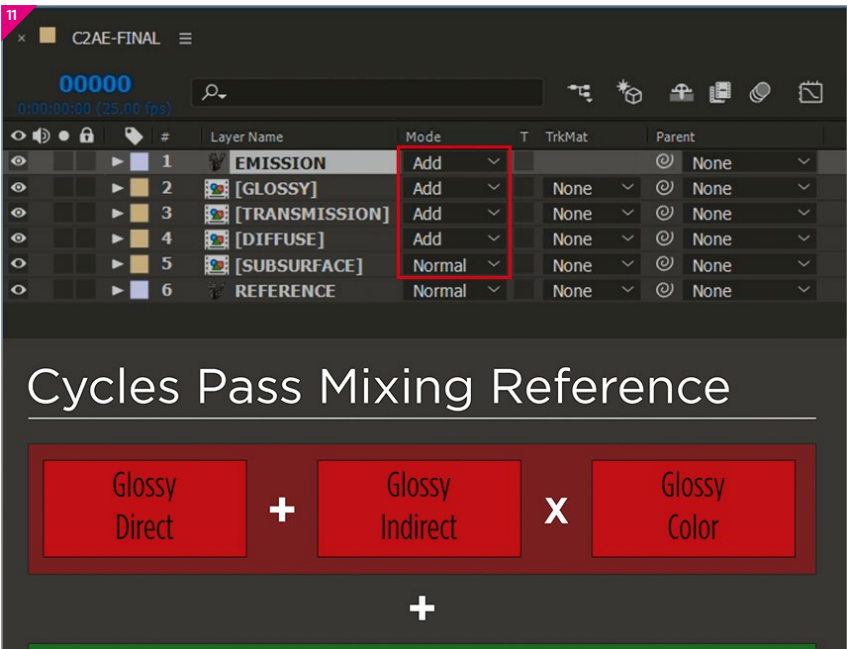
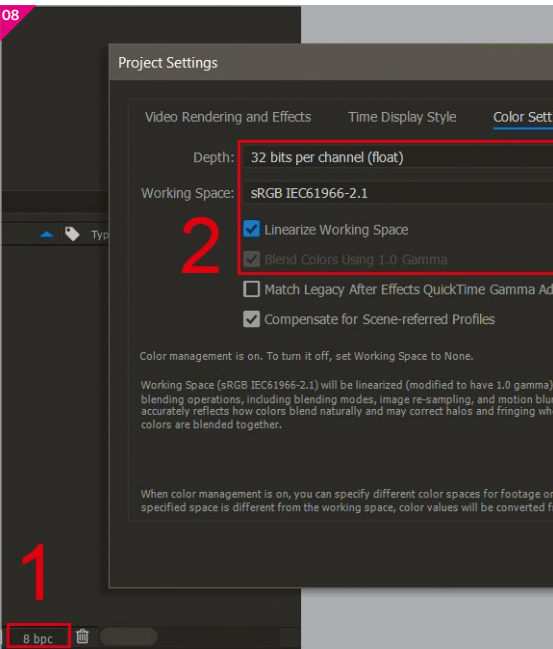
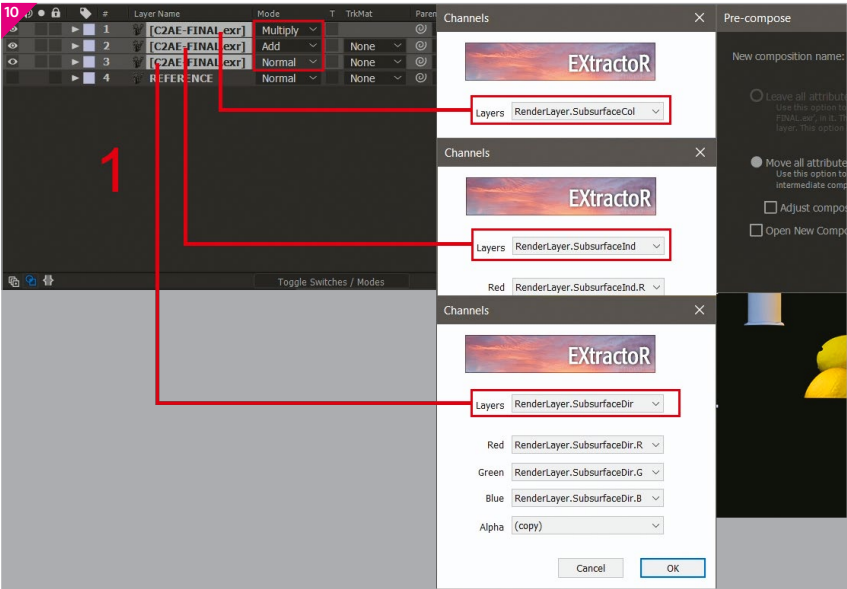
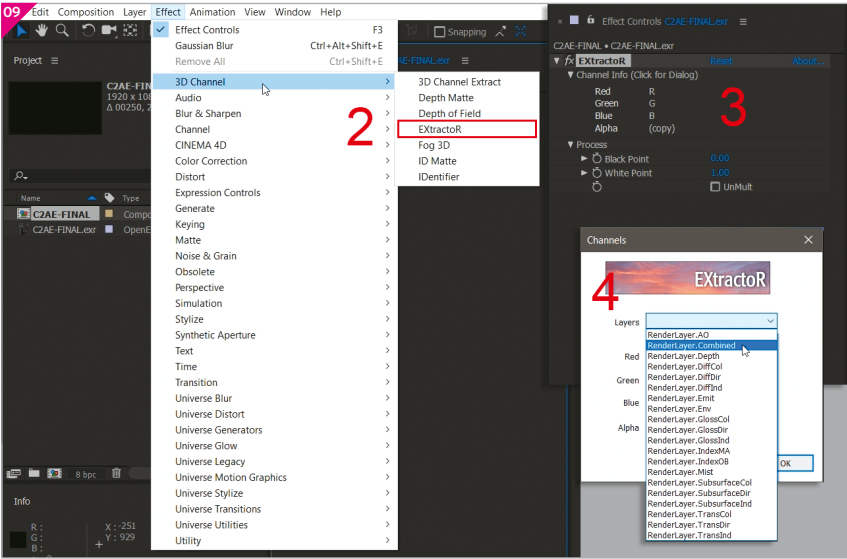
Whenever any changes are made to colours of objects in compositing, remember that anything reflecting said object remains unaffected. This will sometimes limit how extreme the adjustments to the image can be.

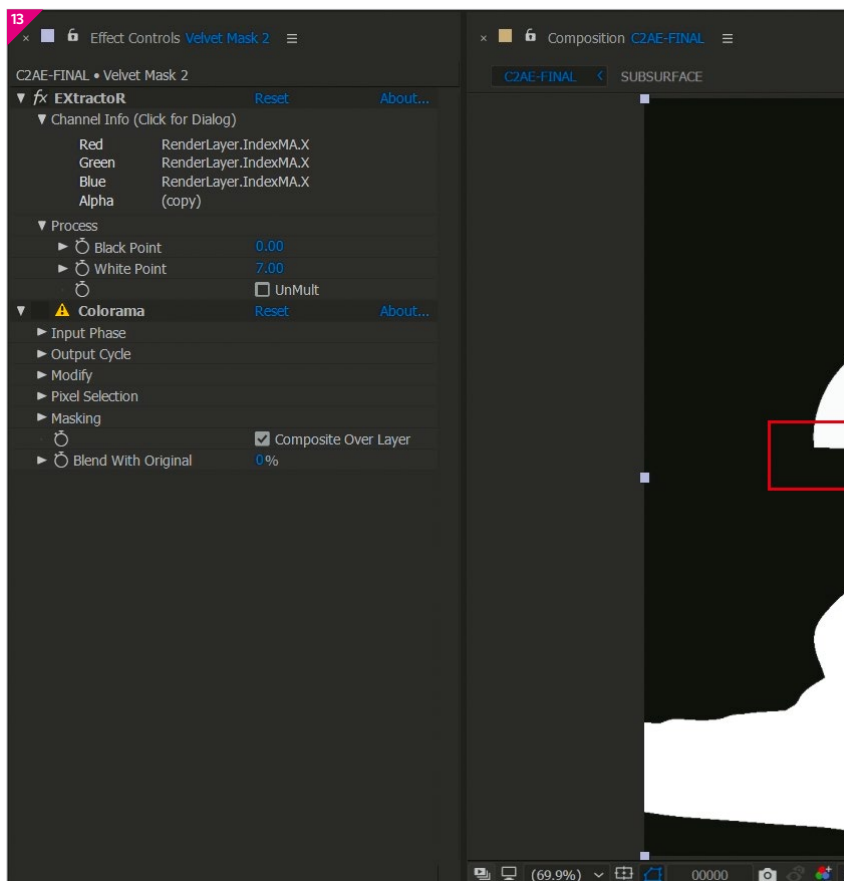
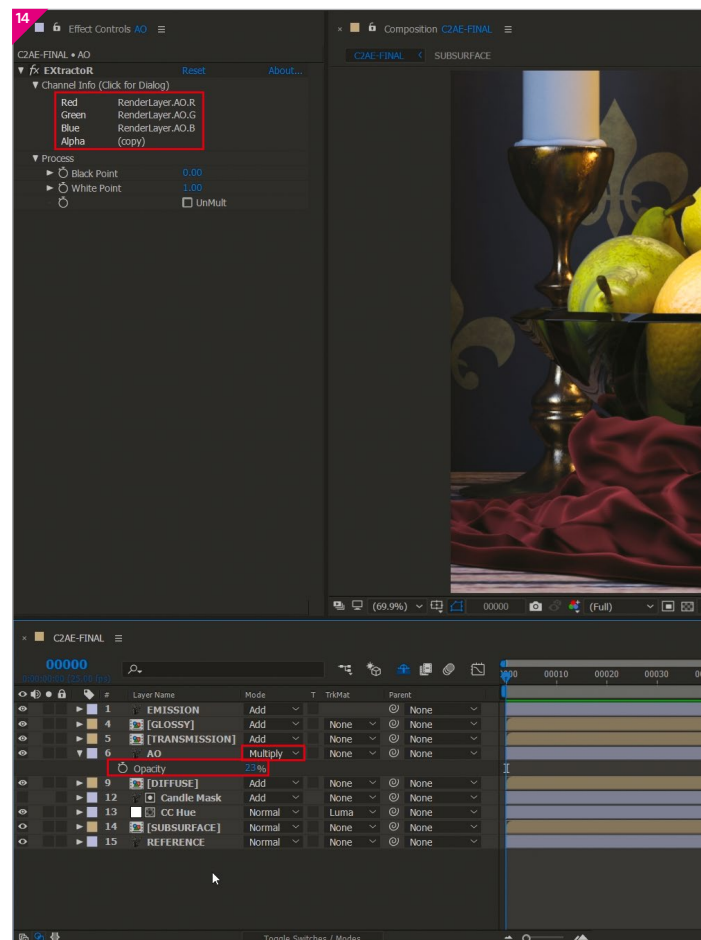
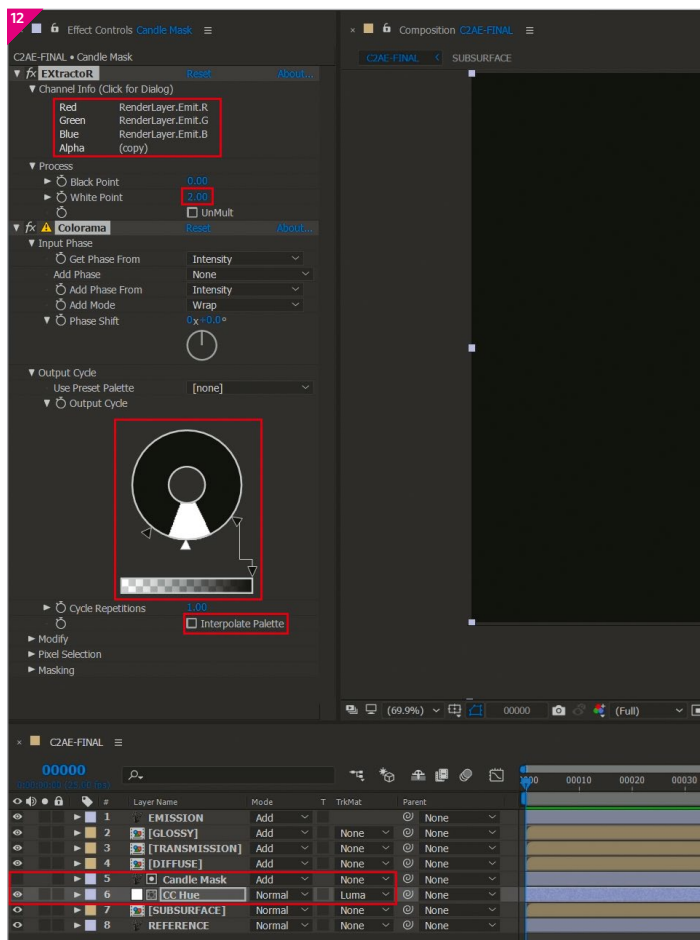
08 Set up After Effects To set up After Effects for a linear workflow, click on the 8bpc button at the bottom of the Project panel. Set the Depth to 32 bits, Working Space to sRGB and tick the Linearize Working Space check box. Now all of the colours in the project will be displayed correctly and it's time to start compositing.

09 Import the render Import the C2AE-FINAL.exr file by going to File>Import. Drag the imported image onto the Composition button at the bottom of the Project panel. After Effects will create a composition with the image in it as a single layer. With the image selected, add the EXtractoR effect to it from the Effects menu. Click on the channels and select RenderLayer.Combined in the layer dropdown. Hit OK to enable the final render to show up in the Composition view. This layer can now be used as a reference when combining all the different passes.

10 Composite the first colour passes Start by duplicating the reference layer three times, so they already have the EXtractoR effect applied to them. Renaming the reference layer keeps things clear. Starting at the top, select the RenderLayer.Subsurface.Col layer in the EXtractoR effect and set the blending mode to Multiply. Select RenderLayer.Subsurface.Ind for the layer under it and set the blending mode to Add. Finally, set RenderLayer.Subsurface.Dir for the third layer, leaving the blending mode at Normal. With these three selected, go to Layer>Pre-Compose to group them together in a new composition called SUBSURFACE.

11 Composite the other colour passes Refer to the Pass mixing chart to set up the Diffuse, Transmission and Glossy passes the same way the Subsurface passes were combined. Don't forget to group each set into a pre-comp with the appropriate name to keep things easily readable. The last pass that needs to be composited on top of the pre-comps is the Emission pass. Copy the reference layer one more time and select the RenderLayer.Emit layer in the EXtractoR plugin. Finally, add together this pass and the pre-comps below it to re-create the reference image.

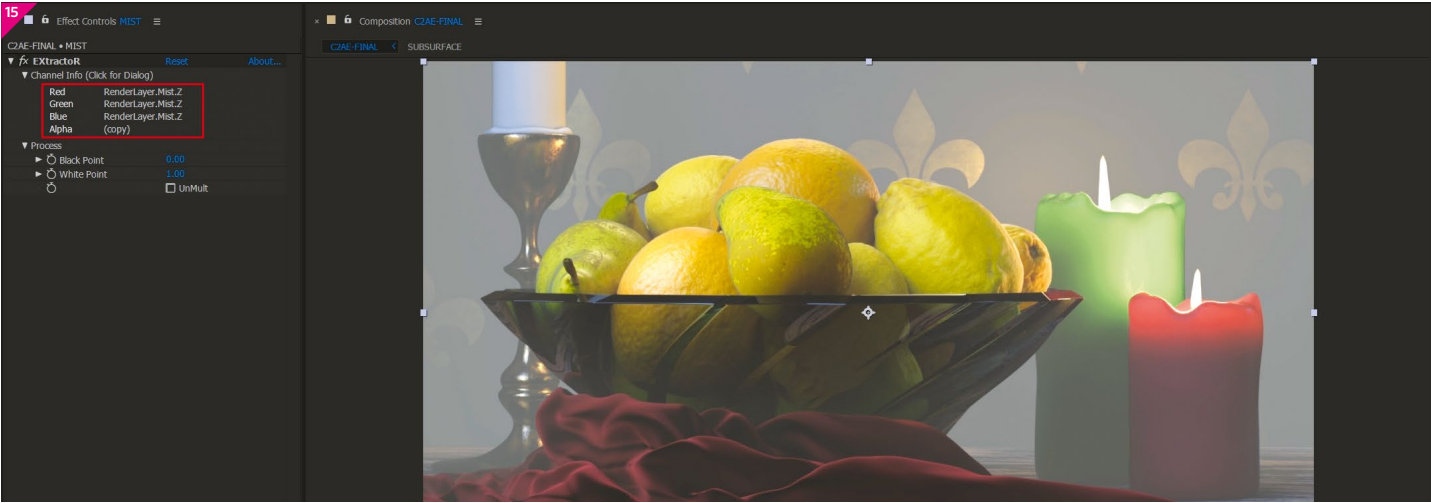




12 Object Index masking To use the masks in the Object Index pass, select the Renderlayer.IndexOB.X channel manually for the Red, Green and Blue channels in the EXtractoR plugin settings. Next, set the White Point to the highest Pass Index selected in Blender. In this case that's 2. To extract the mask from the greyscale image, add a Colorama Effect after the Extractor and finetune it to only have the back candle selected. This can now be used as a Luma Matte for an adjustment layer with a Hue/Saturation effect above the SUBSURFACE group. Please refer to the video for an in-depth explanation of this.

13 Material Index masking The same technique described in the previous step can be applied to the Material Index mask pass. Don't forget to set the EXtractoR white point to 7 instead of 2, as there were 7 Material Pass Indexes set in Blender. Note the limitation of using these mask passes with the fruit, where the mask is limited to the parts of the objects that are directly visible. The parts that are refracted in the bowl aren't masked, as Cycles treats all objects as opaque when creating the mask passes.

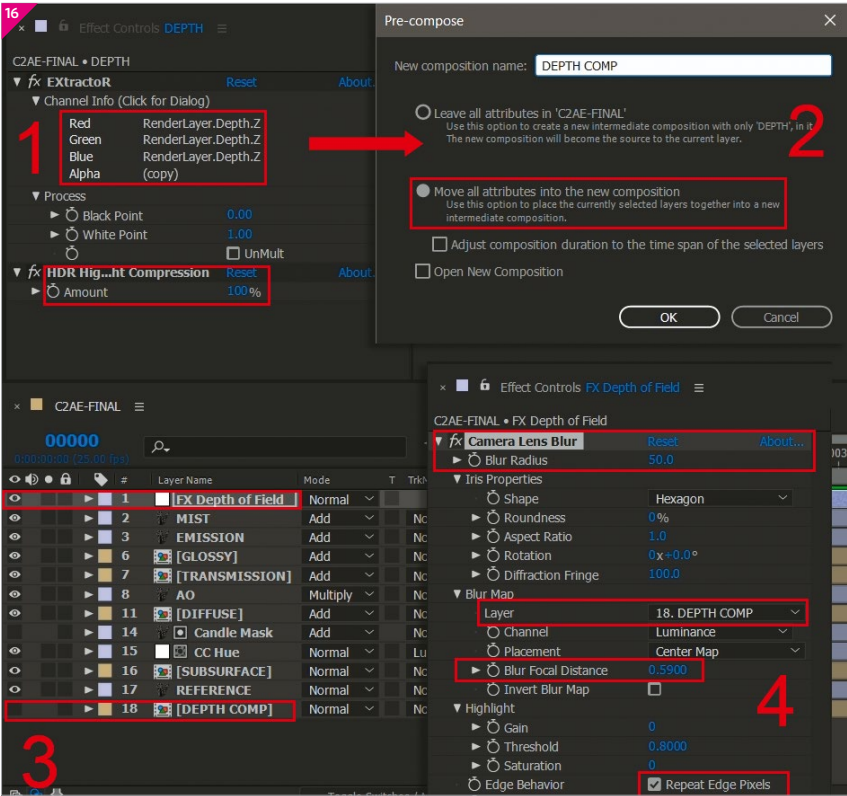
14 The Ambient Occlusion pass This pass can provide extra detail in shadowed areas of the render. Once again, select the correct render layer in the EXtractoR plugin after duplicating the reference layer. When this layer is set to Multiply the white areas of the AO pass disappear and only the dark areas of the pass will affect the final image. Experiment with the opacity of this layer by hitting the T key with it selected in the timeline and changing the Opacity value.

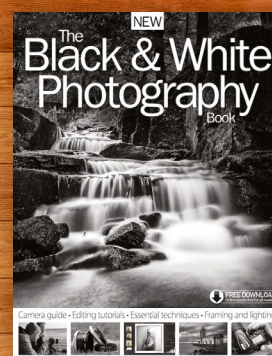
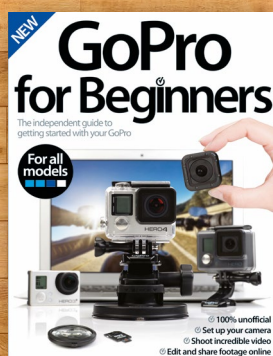
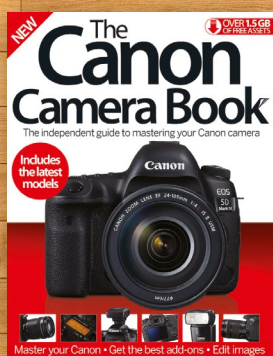


15 The Mist Pass Although this pass is mainly meant for use in large-scale images to create a sense of haze in the air, it's still interesting to experiment with its effect on the scene. In the EXtractoR effect, the Red, Green and Blue channels need to be set manually to the RenderLayer.Mist.Z to get a usable image. Set the layer to Add and experiment with the opacity by hitting the T key with the layer selected.

16 The Depth Pass To use this pass to create depth of field, first set the EXtractoR Red, Green and Blue channels to the RenderLayer.Depth.Z and add a HDR Highlight Compression effect after it from the Utility section in the Effects menu. Then, pre-compose the layer with Move All Attributes Into The New Composition selected with the name DEPTH COMP. This layer can now be turned off and moved to the bottom of the layer stack, as it doesn't need to be visible to use. Add an Adjustment layer to the top with a Camera Lens Blur effect. In the effect, select the newly created DEPTH COMP as the Blur map. Experiment with the focal distance and blur size parameters to tweak the result.

17 Final thoughts While this compositing method takes some time to set up in After Effects, it can reduce the number of re-renders from Cycles if some adjustments need to be made, although some limitations apply. For a more in-depth explanation, be sure to have a look at the video version of the tutorial where each step is explained in more detail.





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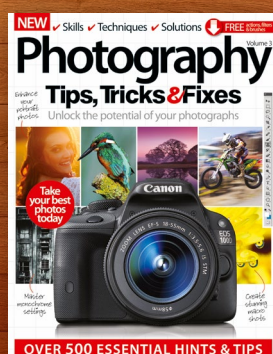
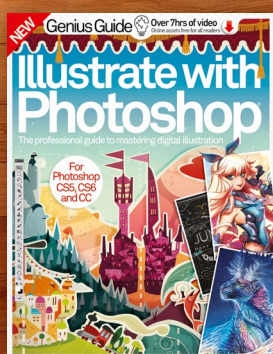
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Leonardo Iezzi
www.leonano.com



Leo currently works at Ubisoft Reflections, having worked at Sony London Studio as an environment artist

KATANA

Rainer Duda
www.rd-innovations.de



Rainer has over a decade of experience in the visual effects industry. He owns a CG production company

SUBSTANCE PAINTER

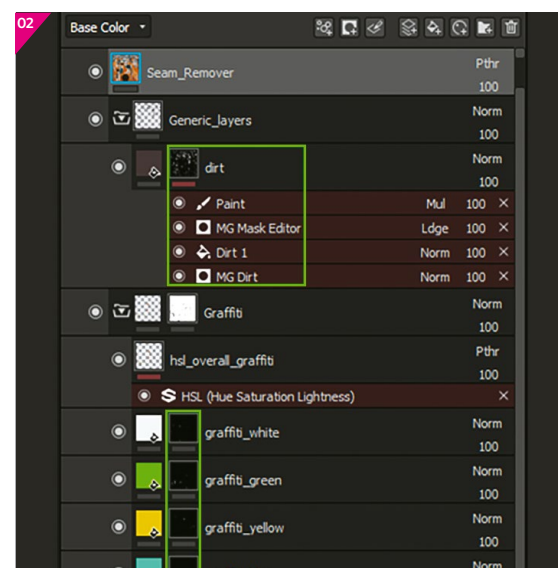
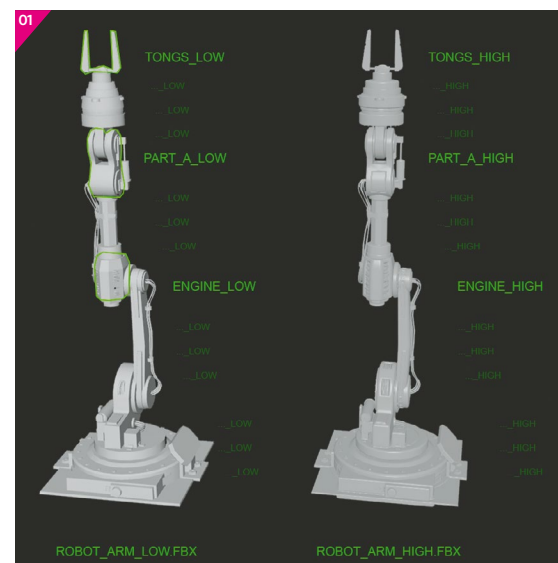
Build post-apocalyptic textures for games

When making a game asset, we often have to endure time-wasting details such as seams, marks and so on. In this tutorial I want to provide some suggestions on achieving better results without wasting time. I'll also share some tips to fix technical issues that we might encounter in our work. We will go through why Painter's baker gives you some features worth using and how time-saving Painter can be with a non-destructive workflow. I'll explain a technique to create good-looking oil marks on your textures and we will discover a cheap and fast way to weld metal pieces without using the support geometry. We will get rid of those seams that appear as a result of the texturing process. Finally, we will learn how to set up your lights in order to get a sweet-looking render of your model in Marmoset Toolbag. Needless to say, you can perform this tutorial in any software you choose. However, I think Painter helps you to work very quickly in a way that software like MARI and Mudbox couldn't. Regarding the rendering step, all the tips are applicable to any render engine either in real-time or offline, as the principle is still the same, so feel free to use what you prefer most. These techniques are the result of my experience in the game industry, and it goes without saying that there are a lot of ways to achieve the same results. I would suggest finding which one you like the most.

01 Bake high polys in Substance Painter Do you explode your meshes in order to avoid baked Normal maps intersecting each other? If you are going to use Painter or Designer you don't need to do that anymore. Thanks to its baker, you can bake mesh/elements by name. Just export your high-poly with the suffix `_high` and your low-poly with `_low`. For example, in your file `gas_tank_low.fbx` you have these meshes/elements: `tank_low` and `valve_low` in the same way that in your `gas_tank_high.fbx` you have `tank_high` and `valve_high`. In this way, Painter or Designer will bake each mesh individually.

02 Assign materials in a non-destructive way The client or your supervisor will give you feedback all the time, and for this reason it's very important to practice a non-destructive workflow as much as you can so you can easily and instantly change information. A golden rule to do that is by trying to avoid painting directly on layers. When I want to add information to my texture, I begin with a Fill layer, then I add a black mask on it and last, I append a Paint layer, which I will use to manually paint on. This approach allows you to modify the properties of the Fill layer, such as base colour, roughness, metallic, height and so on any time, without having to repeat your drawings, since all the painted data is stored in the mask. As you can see, I've stored all my information in the masks only, and this way I can easily and quickly change all my information such as each graffiti colour, the dirty height and the oil roughness without losing my masks.

03 Create oil marks on your model Start by creating a new Fill layer and try to match the colour and the Roughness value with some references. Then apply a black mask with a Paint layer and start to roughly paint some leaking marks – don't bother if they are too clear. Now create a new Paint layer in the mask and set the blending mode to Pass Through. Now it's time for the Smudge tool. With the second Paint layer selected, start to move your Smudge brush in the direction of your leak, moving it up and down until you get what you want. Adding a new oil layer and new leaks with slightly different properties will improve the result, giving it more variety. Don't forget to slightly tweak the layer opacity.

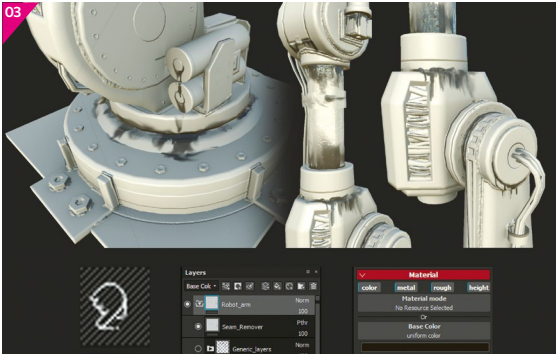
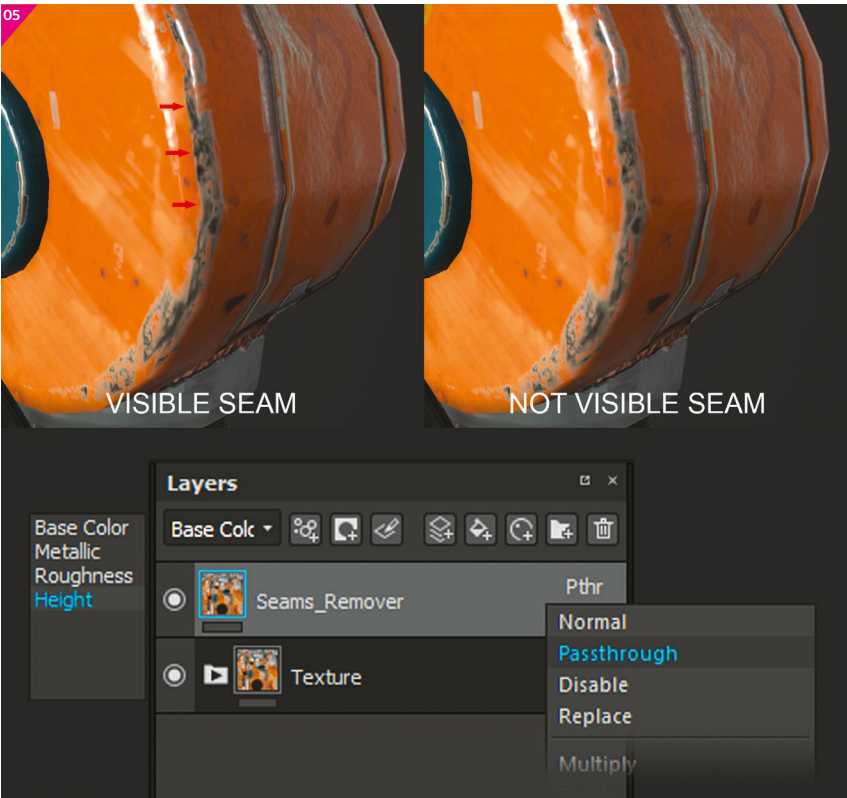
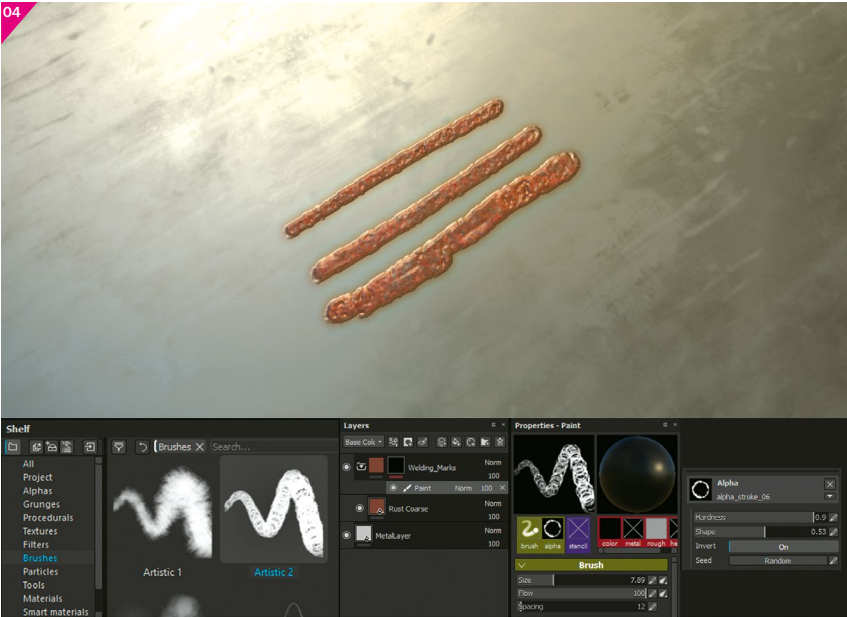




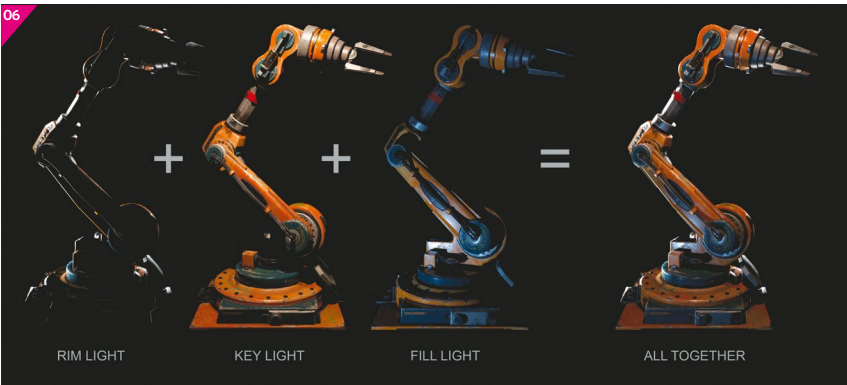
04 Weld the metal parts together The approach you choose to weld two metal pieces depends on a lot of things, but most importantly how closely you'll see it. If you can get very close, I'd suggest using geometry support. Otherwise, you can quickly and easily do it by creating a new Fill layer, or just using a default Rust material, increase the Height map, create a black mask and a Paint layer like we just did for the oil marks. Select the Artistic 2 brush preset, adjust the brush's properties, such as Spacing and Hardness, in order to get a nicer result. Start painting on the edges where you want your weld marks to be. If the Height information is too strong, just tweak down the value on the layer's properties.

05 Paint over the seams For various reasons in game assets we don't have sewn UVs, so we face a lot of problems with noticeable seams even if your Normal baked bevels are accurate. However, we can skirt around the issue by manually painting over all the seams. In order to do that, we have different approaches. The method that appeals to me most is the following: create a layer (not a Fill layer), set the blending mode of every channel to Pass Through, then select the Smudge tool and lightly draw on the edges where the seams are visible. This way, you blend together the information on all the channels simultaneously, making seams fade away.

06 Real-time rendering with Marmoset The last step, but not the least important, is making a render of your assets. Since we are dealing with game assets I'd advise choosing a real-time renderer. In my example, I've chosen Marmoset Toolbag. The first thing you need to take care of is lighting. Avoid using just HDR lighting and light your model using three main lights: a rim light, which brings out the silhouette; a key light, which gives depth to your render; and a fill light to reveal all the details of your textures. At this point, switch back on your HDR, which will improve your reflections.



Problems with Normal maps or texel density? Baking details and bevels from your high-poly model to the Normal map applied to your low poly might be a pain, and it's very common to face problems of noticeable seams or deformation. Another big issue you might experience is having a consistent texel density all over your model. If you have any trouble with either of these, check the tutorials that I made about baking the perfect Normal map, and about understanding texel density. Simply head to www.leonano.com and visit the Tutorial section.





Technique focus

Incredible 3D artists take us behind their artwork

LIGHTING I always stick to reality to make lighting as simple as it can be when working on arch-vis projects. Artificial sources were extremely important in this scene - I studied the intensity of these lights before selecting their shape, colour and position. Combined with the right camera setting, every aspect of the image gets along smoothly together.



Mohammadreza Mohseni
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I am a CG artist with a masters in architecture and over ten years' experience in 3D rendering

Software 3ds Max, Corona, Photoshop, ArionFX, NikCollection

Nuremberg Bathroom,
2016



KATANA

Enhance your workflow with KATANA

The Foundry's KATANA, in conjunction with the famous 3Delight renderer, are key players when it comes to lighting, shading, look development and rendering for professional movie productions and top-notch commercials. In this tutorial you will learn how to import widely used alembic files – which are figuratively the root for professional asset-based workflows – and how to set up a project to render a final image.

During this journey you will discover how the Node Graph – KATANA's core working area – must be used and how the actual data flow is represented. The next major workflow you will learn is for asset behaviour. To control the behaviour of objects in a KATANA project, you must leave the Node Graph and change the asset influence in different contexts through the so-called Scene Graph editor, which can be seen as a file explorer with hierarchies. The general concept underlying both work areas and the interaction from Node Graph to Scene Graph with dataflow will be easier after this tutorial.

01 Start a basic scene setup At first we must create the scene including the hero assets followed by a render camera. Jump to the Node Graph and open the Node menu through the Tab key on the keyboard – an alternative would be to use the right mouse button. By typing the first letters of a

node it will jump to the respective place in the list. We need the following nodes: Camera Create, Alembic In and a Merge node. Both transforms will be used to place the hero asset in the scene. We must expand all branches in the Scene Graph window. Only expanded branches will be shown in the viewer and monitor.

02 Place the camera in position With a simple shaded asset it is already possible to adjust the final camera position. Just jump to the Viewer widget and look through the camera to find a suitable-looking position. The necessary function lies in the centre just below the Perspective view. Unfortunately the output image is still square-shaped. In order to change that, we must append a Render Settings node. In the corresponding attributes, choose HD for the Resolution and activate a function called Adjust Width To Match Resolution. Now the image takes HD 1080p picture information as the global output for rendering.

03 Work on a proper render output Before the render image can be seen in the viewer or in the 3Delight framebuffer, there must be at least two more nodes appended. The first of these two necessary nodes is a DSettings node followed by a Render node. The first is



responsible for choosing the Anti-aliasing Filter method. In this case we must use Blackman-harris with a Filter Width of 3 pixels. In addition to this, it is necessary to say what kind of framebuffer should be used. In this workshop we've stayed in KATANA and haven't used 3Delight's framebuffer. We must choose KATANA's monitor. The Render node enables rendering in passes and on a farm.

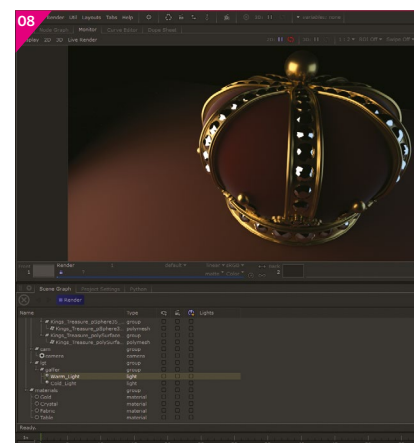
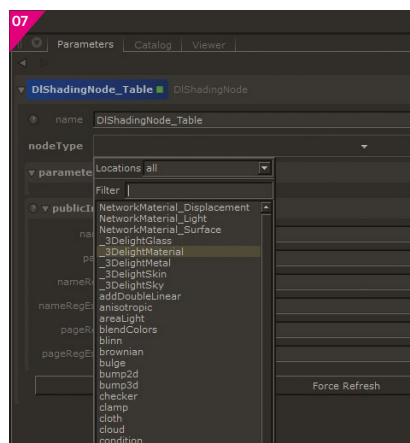
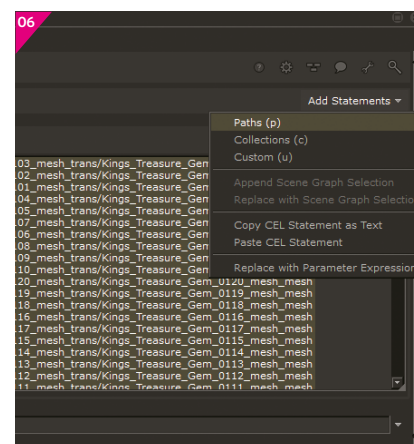
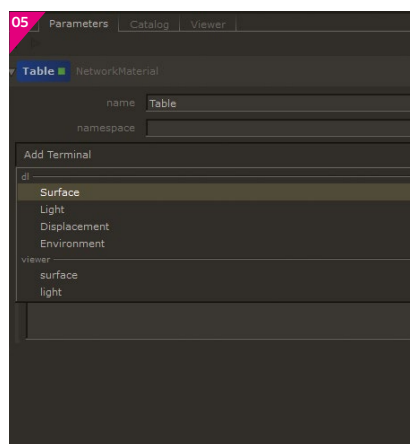
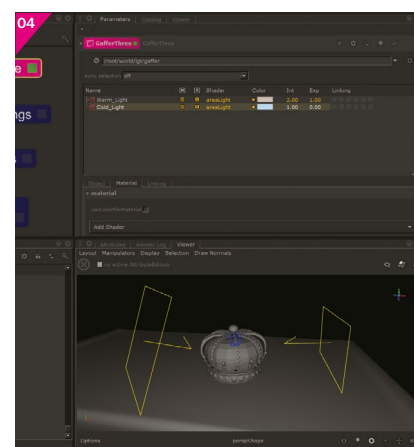
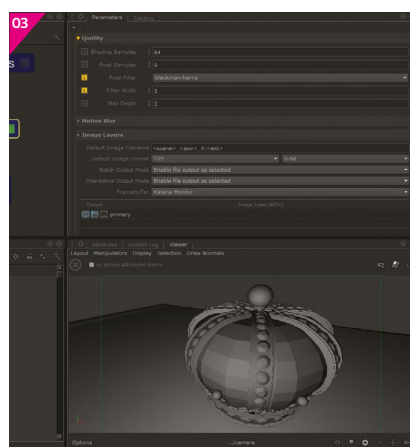
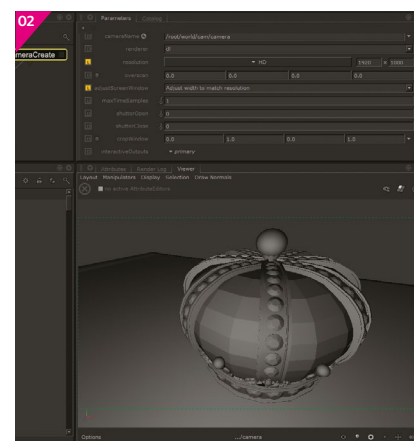
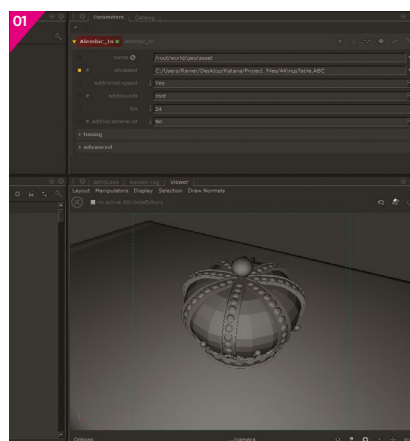
04 Let there be light Before we start working on the materials themselves, it is time to create some basic light sources for a better look in the preview renders. After the Merge node we must append a so-called Gaffer Three node. This node is highly optimised and can hold a large variety of direct and indirect light sources at once. In there we must create two area lights, one with a warm tint and the other with a cooler light-blue tint. The warmer colour will be the main light, which is sending light from the left-hand side, while the cooler light comes from the back on the right-hand corner.

05 Set up basic materials Now we've reached the stage where it's time to work on the materials. There are plenty of ways to create materials in KATANA. In this workshop we've jumped back on the top of our network and we've create four DIShadingNode objects followed by four Network Material nodes, one for gold, crystal, red SSS and a material for the desk. Feel free to create crystal-coloured variations. The Network Material nodes will obey a material supplier by giving them a so-called DI Surface Terminal, which is nothing more than a connector to input the colour out from the DIShadingNode objects.

06 Assign the materials for adjustments The basic materials are in place but still not assigned, and that will be our next step. Directly after the Merge node we must append four Material Assign nodes from the Node menu. Each Material Assign node consists of two blocks. In the Material Assign block we must take the corresponding material from the Scene Graph and drag and drop it with the middle mouse button into the Material Assign field. In the upper area we'll want to keep it simple with a path function in the CEL field. In this field goes the geometry that needs to have the material assigned. Repeat this step for all materials.

07 Tweak the materials Creating a Shading node followed by a Terminal only gives us a material template. Now it is time to create real materials. In order to do this, we must go back to each individual DIShadingNode object. In the Attributes we must set a Correct Node type. By using the drop-down menu we are able to choose between predefined Material Builder nodes, as well as Single Functions to build a complete material. For the red velvet material of the crown we could use a _3delightSkin material, which gives us the ability to use subsurface scattering for a nice, premium velvet effect. There is also a _3delightMetal preset followed by a master material called _3delightMaterial.

08 Render the final image For the framebuffer we're using KATANA's monitor, which means all images will appear over there and will be saved into the catalogue. To start a render simply Ctrl/right-click on a node - preferably the Render node - and choose a preview image or the Rendering To Disc mode, which will save the image or sequence into the specified folder that was set in the DISettings node.



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PNY NVIDIA Quadro P5000

A new 16nm microarchitecture and specification bump delivers significantly better all-round performance

NVIDIA's rollout of the Pascal microarchitecture to its professional GPUs, once again through sole manufacturing partner PNY, has begun with new cards across the board, ranging from the entry-level Quadro P400 right up to the monstrous P6000. The P5000 sits right underneath it as the second most-powerful 3D card in NVIDIA's lineup.

Pascal is NVIDIA's most significant GPU architecture upgrade in years, as it finally shrinks the 28nm process that was used in previous generations, such as Maxwell and Kepler, down to 16nm. A smaller processor means more transistors can be fit into the same space and (theoretically) a similar power envelope, which translates to significantly better performance.

The P5000 uses the same GP104 core as the gaming-oriented GeForce GTX 1080, albeit with various enhancements such as certified drivers and error-correcting code memory, which significantly adds to the cost. It ups the memory capacity to 16GB of GDDR5X (a new, high-bandwidth memory standard), providing more room to work with larger textures and datasets.

Its a dual-slot physical design, with a single power connector, retaining the four DisplayPort outputs of the M5000 and a single DVI-D connector, while offering significantly higher bandwidth for display data thanks to support for the DisplayPort 1.4 standard, ensuring compatibility with the forthcoming crop of 4K displays with refresh rates around 60Hz, a feature that gamers are likely to be falling over themselves for, in time.

Notably, the funky angular design and efficient cooler of the GeForce GTX 1080 has not been carried over to the Quadro cards, which retain a more mundane appearance.

Compared with the M5000, the GP104 core clock has almost doubled to 1607 MHz, but with a slower memory clock of 1251 MHz, for 288 GB/sec of memory bandwidth. Shader count has increased to 2,560. TDP has jumped to 180w, above the 150w used in Kepler and Maxwell cards. CUDA support is now at 6.1. Total FP32 computing power is pegged at 8.9 TFLOPs, a huge leap from 4.3 TFLOPs in the M5000.

Last month we covered Chillblast's Fusion Pascal, which paired the card with a 3GHz,

10-core Intel Core i7-6950x chip. This month, retailer Escape Technology kindly sent us another workstation equipped with a P5000, an HP Z640, which has fast become the system of choice in large-scale commercial project rendering setups.

It's notable for a very different CPU configuration: dual Xeon E5-2630 v4 chips and 64GB of system memory, offering a tasty total of 20 physical cores (40 with hyper-threading), but at a mere 2.2 GHz base clock frequency.

In some tests, these performance differences give us some idea of how much CPU clock frequency and core count affects a modern workstation. In short, raw GPU performance benefits more from faster clock speeds than more cores, but not in every test.

ArionBench, a good indicator of raw CUDA performance, without any reliance on CPU speed at all, shows a significant gain over the M5000, leaping up to 2,673 points.

OpenCL performance on the other hand, which received a massive boost with Maxwell, improves by a further 25 per cent here, with 12,531 points and again, the result was just about identical on both systems.

But with SPECviewperf, we saw some tests fall behind on the Xeon-equipped HP Z640, compared with the faster Core i7 chip. Catia was 30 points slower, Creo 25 points slower. It confirms our view that the Core i7-6950x is a better recommendation as an all-purpose CPU choice for artists, unless of course they work entirely with rendering tools that maximise their CPU cores.

Comparatively, we tested the M5000 in a workstation with an even faster 4 GHz 8-core Core i7 5960x, which leaves the GPU more headroom for performance, but skewing our results in a direct comparison. In some cases the P5000 in the 2.2GHz HP Z640 was only slightly faster than the M5000 in a 4GHz workstation, but it clearly storms ahead when paired with the faster CPU in Chillblast's rig.

That illustrates our point further. The P5000 is superb, and in many cases delivers massively improved performance over the M5000. But if you're considering such a significant investment in graphics hardware, you have to pay attention to how up-to-date the rest of your computer is, too.

Orestis Bastounis



IRAY PERFORMANCE

Quadro cards have supported GPU-based rendering through NVIDIA's Iray plugin for some time. But as of 3ds Max 2017 you can use your GPU for a significant performance improvement over CPU-based rendering, with NVIDIA's new mental ray 3.14 renderer as well, thanks to its new GI engine called GI Next. Offering full support for mental ray shaders, NVIDIA touts GI Next as 2-4x faster than Final Gather Force, so you should expect much better performance from the new renderer without having to make significant changes to your workflow. NVIDIA's MDL format for physical materials, which is cross compatible with Iray, supports all traditional mental ray Effects. Ambient Occlusion Pass is now also computed on the GPU as well. According to NVIDIA's chart the P5000 performs 50 per cent faster in mental ray over the M5000, in terms relative performance against CPU-only rendering.



LEFT The Pascal-based Quados have a more mundane appearance than the GeForce GTX 1080

MAIN 16GB of GDDR5X offers a significant boost to memory performance

BELOW Our testing has really demonstrated the need for a fast CPU to make the most of the P5000

BOTTOM CUDA performance, and therefore corresponding render times using mental ray and Iray, is the biggest leap forward this generation



Essential info

Price	£1,950
Website	www.pny.com
VRAM	16GB GDDR5X
Bandwidth	288 GB/sec
Clock speed	1,607 MHz
Shader count	2,560
Performance	8.9 TFLOPs

Summary

★★★★★	Features
★★★★★	Performance
★★★★★	Design
★★★★★	Value for money

Verdict ★★★★★

The P5000 packs some high-end hardware for significant performance gains in CUDA applications

HDR Light Studio 5.4

The latest HDRLS release ushers in new features, light sources, connection updates and improves usability

Developed by UK-based company Lightmap, HDR Light Studio is a complete lighting solution aimed at professional artists and has an impressive customer base including many world-class studios, boutiques and instantly recognisable brands.

The Advanced Rotations feature, new in v5.4, lets you quickly customise existing HDRIs by adding image-based and procedural lights with greater control. Previously, after you drag-and-dropped lighting from the Presets pane onto the Canvas containing your HDRI, placements were hindered to being constrained to the centre of the sphere mapped with a HDRI. Instead, you now have the freedom to work with XYZ transformations in World Space and via four Rotation modes (Free, V-Lock, H-Lock and Fixed) located in the Light Properties, Transform (Extended) rollout under Enable Advanced Rotations. V-Lock restricts movements to vertical, H-Lock to horizontal and Fixed positions a light horizontally aligned to the world X axis (looking down from above). XYZ rotations are applied as an offset to the Rotation Mode. This makes authoring custom HDRIs incredibly artist-friendly, and using the presets you can incorporate windows, decals and logos, augment lighting and more. Adding customisations takes mere minutes.

Thankfully, this toolset isn't just restricted to HDRI work. When lighting 3D assets, for example, Area lights can also be controlled using the Rotation modes, which unlocks the ability to point Area Lights in any direction. Further control has been added for placing lights by enabling the repositioning of their Light Handle (which act as a pivot point). The Light Handle is displayed as a small orange dot that by default is central in the Light Preview pane and can now be dragged around or repositioned using sliders. This makes it easier to transform a light by its edge, which is ideal for placing lights or imagery that needs its edge on the ground plane, for example.

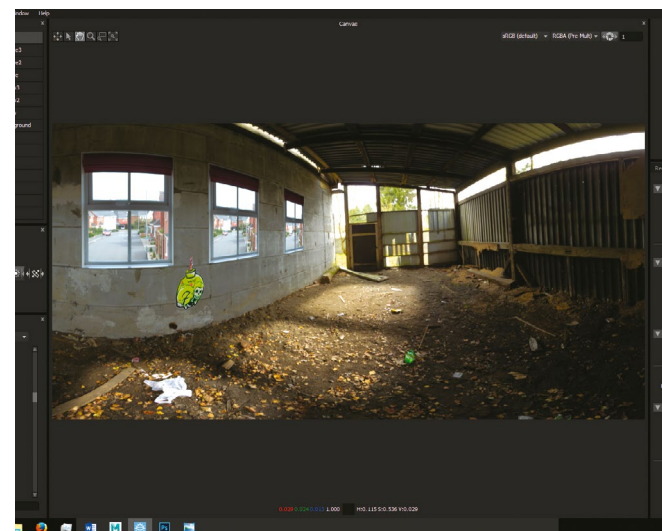
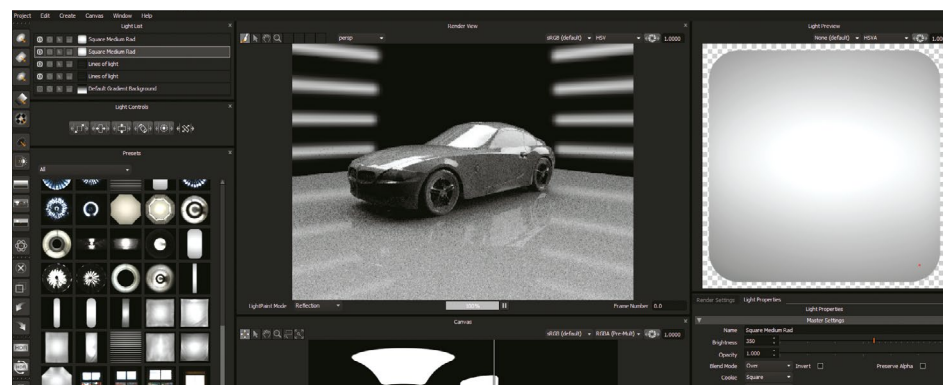
On top of that, 32 new light sources have been added as a separate download to accompany the release and this expands on the existing library of presets. The presets accurately mimic studio lighting and serve as an antidote to the often bland lights offered by 3D apps out of the box. However, options to rename presets and to search by name would increase usability as opposed to manually scrolling through the range available. Some categories are rather limited with assets and there's no workflow for artists to add their own to the library at present.

If you trying the 15-day demo, the new presets are still available to use, but the trade-off is that they're low resolution. A couple of interface updates let the cursor display the active tool in the Canvas, Render View and Light Preview panes and you can now double-click a slider's parameter name to reset to its default value.

As a standalone product, HDRLS does fit neatly into your pipeline. Load in your textured asset and camera, set up lighting and export for final rendering. Or you could alternatively use HDRLS exclusively to customise HDRIs. Connections with a number of industry-standard applications for your pipeline setup are available at an additional fee. We used it in conjunction with Maya 2017 and Arnold, although the option to render with V-Ray, mental ray, Maxwell, Octane, RenderMan and Iray plug-ins is included with the Maya connection fee. Connections grant artists the ability to see results almost instantly with interactive rendering in their 3D app and provide the freedom to move the lighting setup between apps and renderers if needed which is a massive timesaver.

Coinciding with the new release are connection updates for 3ds Max 2017 including ART Renderer and Arnold, Cinema 4D R18 and DeltaGen 2017x. Lighting scenes in HDRLS and seeing the results update right away in Arnold efficiently bypasses a lot of trial and error in your workflow.

Paul Champion



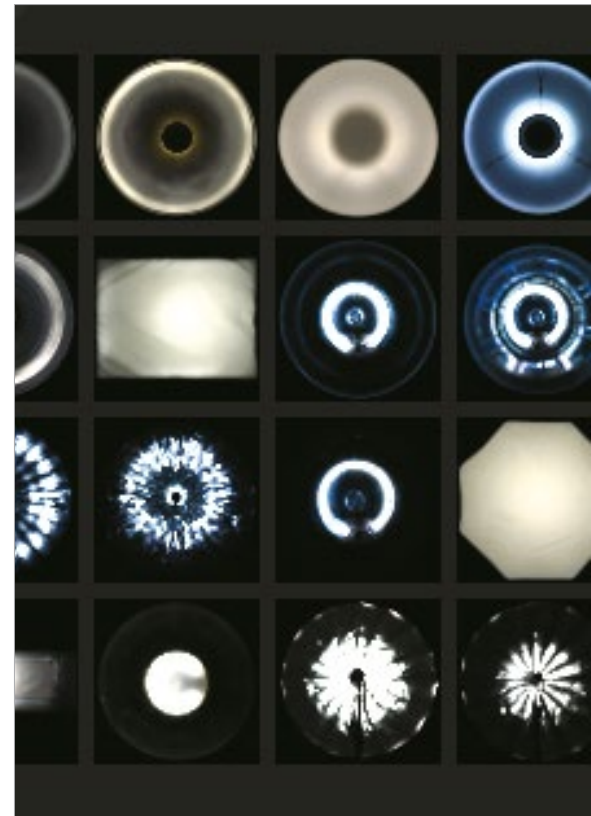


MAIN HDRLS provides a fast solution for creating your own HDRI maps to studio light your product

BOTTOM LEFT Being able to edit Light Handles gives you greater control over light source placement and makes fine-tuning notably easier

BOTTOM MIDDLE The well-presented and intuitive UI means you won't be needlessly fumbling around for tools and settings while trying to meet a tight deadline

BELOW The Presets library of light sources contains many 4K HDR photos of real studio lights designed to bring realism to your renders



Essential info

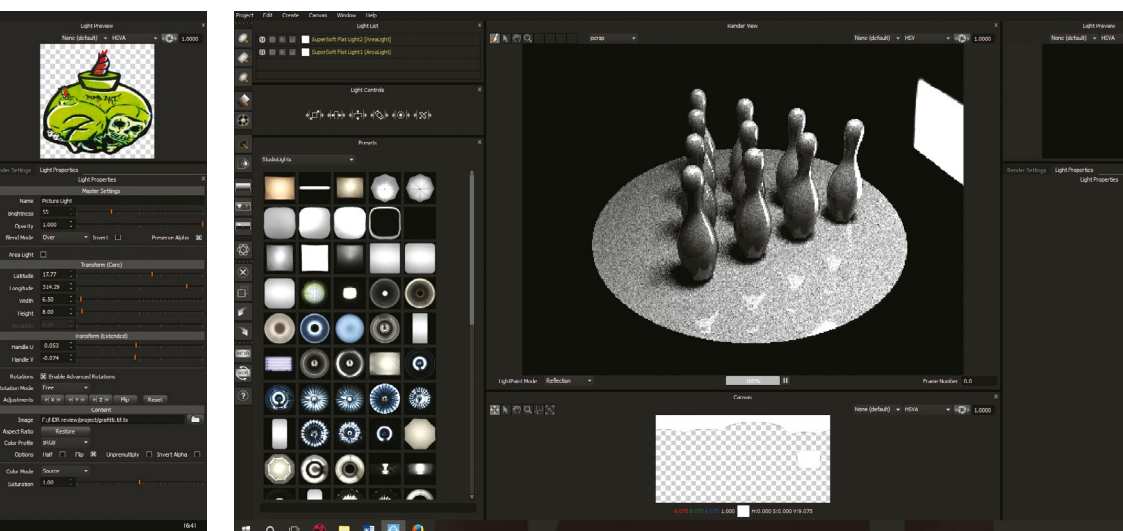
Price	From £295
Website	www.lightmap.co.uk
OS	Windows 7 and above, Mac OS 10.7 and above, Linux Fedora 13 and above
CPU	4 cores minimum
RAM	8GB minimum
Graphics Card	Any, HDR Light Studio is CPU based
HDD	Requires 6.5GB for a full installation with Preset Lights

Summary

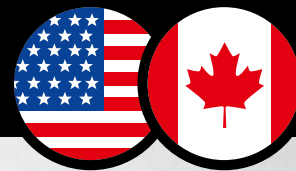
★★★★★ Features
 ★★★★★ Performance
 ★★★★★ Design
 ★★★★★ Value for money

Verdict ★★★★★

Already a very competent and artist-friendly lighting solution, HDRLS now features advanced tools to improve usability



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The Hub

The inside guide to industry news,
VFX studios, expert opinions
and the 3D community

“We settled for a facial rig made of many interlocking pieces that would slide against each other without deforming. This was technically tricky to do, since the setup had to work and avoid collisions between the pieces”

Ferran Domenech,
MPC

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ZBrushLIVE brings pro content live to homes

Why Pixologic is broadcasting exclusive ZBrush content throughout the year

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Octane in Unity

Light baking in Unity gets an upgrade, and Chaos Group's co-founder is awarded a sci-tech Oscar!

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A Monster Calls

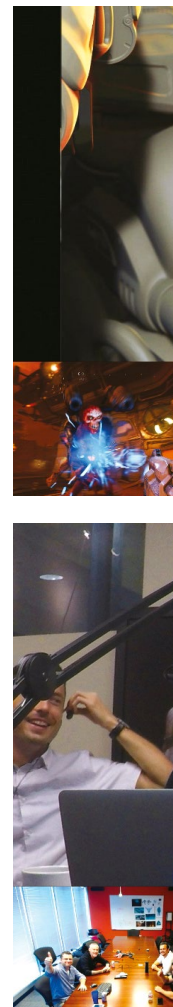
MPC tells us how it created the ultimate monster

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Learn from the best in the business with ZBrushLIVE

Media portal launched with live Twitch broadcasts featuring triple-A artists and industry pros, the ZBrush Podcast, ZBrush news and much more

Not content with only broadcasting live streams during its annual ZBrushSummit events, Pixologic has launched ZBrushLIVE, a one-stop shop for watching and listening to ZBrush-themed videos and podcasts.

Launched on 6 February 2017, ZBrushLIVE has a regular schedule of live Twitch broadcasts featuring artists from the industry presenting content that includes character creation, product design, 3D printing and more.

"Pixologic has been dedicated to building a thriving artistic community from the very beginning," says Michael Nisbet, social media coordinator at Pixologic. "The artists and professionals we have gotten to know over the years have become like family and we strive to keep that family connected, growing and always supplied with information and resources to promote growth as not only artists, but as an increasingly social and educational group of friends and collaborators."

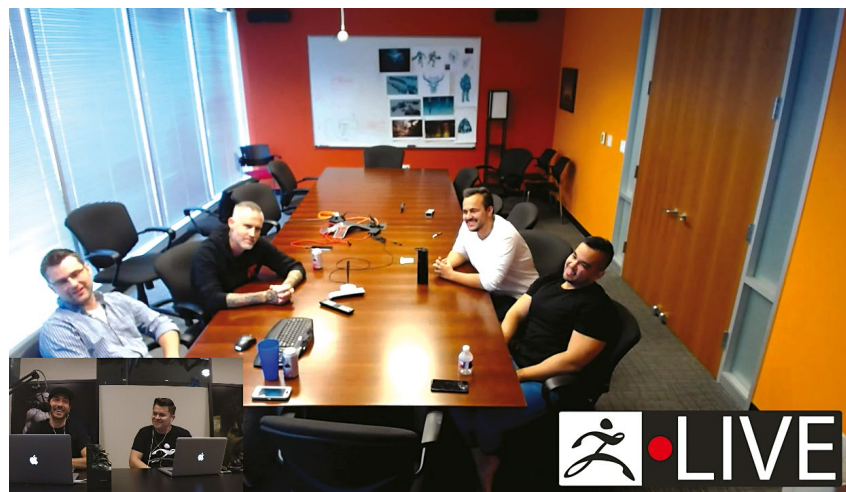
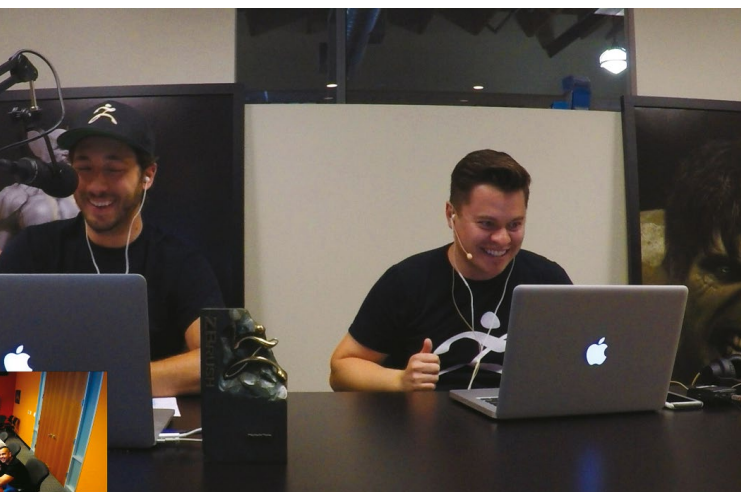
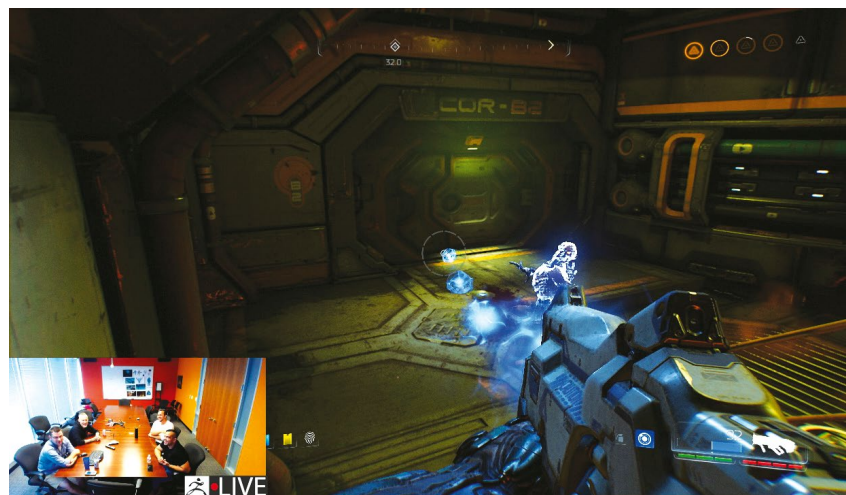
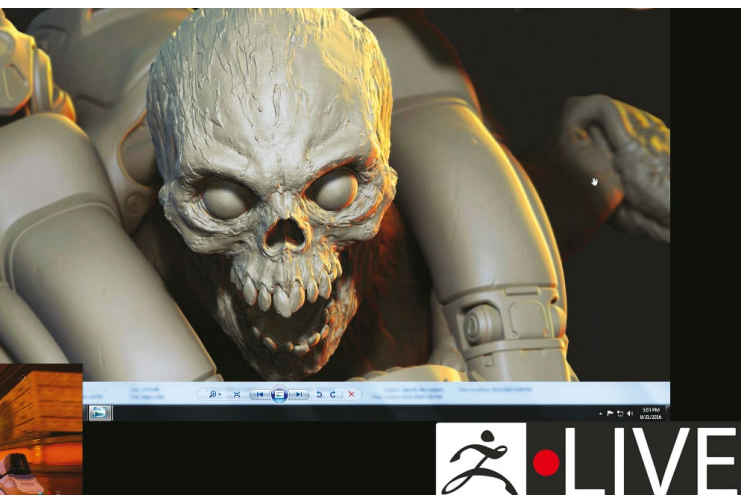
ZBrushSummit live streams have previously featured sculpt-offs between some of the best artists in the industry

as well as ZPlays, which debuted at the Summit in 2016. ZPlays will be one of the additions to the portal. "In addition to live sculpting and design, one of our most exciting new endeavours are our ZPlays," says Nisbet. "These segments feature the Pixologic staff playing recent titles along with artists from the studio sharing behind-the-scenes info, including the assets used to create the in-game models live on Twitch... Each episode has been incredibly fun and full of fascinating information behind some great games. 2017 will feature more of the hottest new games and the artists behind them who will be able to answer questions and interact with fans live as we get our first look at the new titles for this year."

These exclusive hour-long live gaming sessions feature the artists' commentary, along with career trajectory of the artists, Q&A from viewers, modelling tips, workflow discussion, shared assets and behind-the-scenes insight on the game being played. Previous episodes include sessions on *Fallout 4* with Bethesda character artists Dennis Mejillones and

2017 will feature more of the hottest new games and the artists behind them who will be able to answer questions and interact with fans live

Michael Nisbet,
Pixologic



Lucas Hardi; *Doom* with id Software character artists Bryan Wynia, Denzil O'Neill, Jason Martin and Emanuel Palalic; and *Final Fantasy XV* with previous workflow content from the *Kingsglaive* Square Enix ZBrushSummit presentation by character and monster modelling supervisor Yuichi Itoyama and CG designer Mitsunobu Ochi.

"The annual ZBrushSummit has been a testament to the strength of this community and we're humbled each year to meet people from around the world who are eager to learn and meet other artists like themselves," continues Nisbet. "It keeps us striving to provide newer, increasingly engaging content to accompany them along their journey and give artists a community they can call their own."

Also re-homed to ZBrushLIVE is the ZBrush Podcast, which is a recorded, downloadable casual conversation between Pixologic and top artists in film, games and more. Concept artist Justin Goby Fields, Pixo Studio and lead creature modellers (Kris Costa, Sunny Wei and Patrick Gagne) from ILM have all already featured on the Podcast. Audio from the ZPlays is also available in podcast form.

"ZBrushLIVE marks the next step in expanding our artist family," concludes Nisbet. "Our new Twitch channel and The ZBrush Podcast are aimed to be more social and interactive in a way that is fun and allows the community to get to know professionals and network with other users."



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The Octane integration was first announced at Unity's Unite 2016 event

Unity adds Octane

The integration of Octane will go "beyond texture maps"

Originally announced at Unite 2016, OTOY revealed that OctaneRender and the ORBX file format would be integrated into the Unity game engine for free sometime in 2017.

CEO and OTOY founder Jules Urbach has since announced more details of the integration. Speaking to UploadVR, Urbach said that users will be able to "take ORBX scenes from a plugin Octane supports... bring them into Unity and rather than rendering

them as a cinematic output asset, you can turn them into a mesh, ingest them into the Unity scene graph and use Octane to bake lightmaps, light probes, all of it."

"The future of baking has to go beyond texture maps," says Urbach, "and that's one of the reasons we've introduced, officially... lightfield baking."

Lightfield baking will take any bounding volume, pre-process it on the cloud and create a holographic volume. "This object is like a texture map, it can be decoded at 1,000 frames a second and within that volume you have perfect 60 degrees of freedom," he continues to explain. "It's amazing for replacement of mesh-based baked lighting, and more importantly it can also encode relighting information."

Speaking of the game-changing lightfield baking feature, Urbach states, "These things are really the components for taking real-time game engine content to the next level and Octane's going to provide the pathway towards that."

No-bake recipes

Jules Urbach, chief executive officer of OTOY, says that the newly integrated features in Unity will go beyond lightmap baking. A real-time dynamic pathtracer will be added to Octane 4, he explains. "This really is the future of rendering - with pathtracing, you're able to leverage an unlimited number of instances."

Chaos Group co-founder wins Oscar

Vlado Koylazov received Scientific and Engineering Award for creating V-Ray

The 2017 Academy Awards has given a sci-tech Oscar to Chaos Group's Vlado Koylazov for the "original concept, design and implementation" of V-Ray.

"This award reflects the hard work and dedication of the entire V-Ray team," said Koylazov, chief technical officer and co-founder of Chaos Group. "I am also immensely thankful to all the artists and studios for the great work they have created with V-Ray over the years. I would like to congratulate the other Sci-Tech winners as well - their efforts have pushed the boundaries of visual effects in film. We are looking forward to more great movies in the years to come."

Other winners of the sci-tech Awards include Marcos Fajardo for Arnold; Larry Gritz for the Open Shading Language; Kiran Bhat, Michael Koperwas, Brian Cantwell and Paige Warner for the ILM facial performance-capture solving system; Nicholas Apostoloff and Geoff Wedig for the design and development of animation rig-based facial performance-capture systems at ImageMovers Digital and Digital Domain; Carl Ludwig, Eugene Troubetzkoy and Maurice van Swaaij for the CGI Studio renderer at Blue Sky Studios, and more.



V-Ray, created by Vlado Koylazov, has been used on over 150 feature films since 2002

HAVE YOU HEARD? Guillermo Del Toro's animated series, *Trollhunters*, is now available to watch on Netflix!

\$500,000 up for grabs for new games idea

Epic Games and Wellcome have organised a new competition for European dev studios

If \$5 million wasn't enough to hand out as part of its Unreal Dev Grants, Epic Games has launched an entirely new way for devs in Europe to win from a pool of a whopping \$500,000.

Working in collaboration with Wellcome, the competition will see hopeful developers submitting new game ideas based on the theme 'transformations'.

Six semi-finalists will then be chosen and given \$15,000 each to get them started on their projects. Then the next round will see just three of the six semi-final teams chosen, with \$60,000 given out to help with their game development.

The winning game will be announced on 24 January 2018, with the winner receiving \$150,000.



The theme of transformations is based on the idea of exploring the human condition

Rocket 3F v1.0

The new polygon modeller aims to be fast, friendly and fun for everyone who utilises it

Rocket 3F, created by concept artist Andrei Samardac and programmer Kun Shi, is a simple polygonal modelling tool for capturing ideas and translating them into the 3D space.

Rocket 3F has streamlined tools that allows you to work very quickly with only a mouse – or stylus – and without additional windows. Another tool called Preview allows you to see the model at the final stage without rendering. On top of that, Hard Edge and Organic Edge enable the user to work with different types of object, while the Creased Edges function creates creases easily and can be changed to hard or organic at any time.

To learn more about the software or to get your own iteration, visit www.rocket3f.com.

PFTrack 2017 unleashed

Pixel Farm claims its new release is "unrivalled" by any other similar app features

The 2017 version of PFTrack has been released by Pixel Farm, which have said that it is the "possibly our biggest upgrade since the introduction of the highly-acclaimed node tree in 2011".

New features include the embedded functionality of PFDepth nodes in PFTrack with added methods for creating and manipulating Depth maps. The stereo camera and image pipeline has been extended, and so has the digital photography camera support. The user interface has been enhanced to provide better productivity and there are now advanced photogrammetry texture extraction tools.

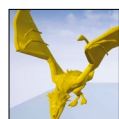
For the full list of features, be sure to visit www.thepixelfarm.co.uk.



The Z-Depth Solver node has been updated for PFTrack 2017

Software shorts

Bringing you the lowdown on product updates and launches



iKinema LiveAction3

Version 3 of the mocap retargeting tool for Unreal Engine features automatic bone mapping and support for custom mocap systems. You can also stream real-time mocap data in real time for viewing in UE4. Other features include Template editor, custom name matching, skeleton matching on target rig and an improved workflow for ACP.



C4Dome 2.75

Popular HDR lighting plugin C4Dome now supports Cinema 4D R18 with express compositing in just one click, easily adjustable HDRI tone mapping, three kinds of floor system presets for reflections, an HDRI painter for painting your own HDRI maps, as well as the additional ability to save and load lighting presets.



Polybrush 1.5

The 3D modelling editor now has an updated interface. Bones is also now a mode instead of a tool for creating precise forms, with a new Surface tool for creating a surface between bones. The new Pipes tool also replaces bones to smooth pipes with any section. To learn more about Polybrush, head online to www.polybrush.org.

DID YOU KNOW? Hugo Barra, a former vice president at Google, will now be vice president of VR at Oculus



Studio MPC

Website moving-picture.com

Location Montreal, Canada

Project *A Monster Calls*

Project description *A Monster Calls* stars Lewis MacDougall as a 12-year-old boy who befriends a monster, voiced by celebrated actor Liam Neeson

Company bio MPC has over 25 years of experience as one of the top VFX studios in the world for film and advertising. With its headquarters in London, UK, MPC also has facilities in Canada, US, the Netherlands, France, China and India. MPC won an Academy Award in 2012 for its visual effects work on *Life Of Pi*.

Contributors

• Ferran Domenech,
VFX supervisor

A Monster Calls

VFX supervisor Ferran Domenech tells us how MPC built the ultimate monster from the ground up

Conor O'Malley is only 12 years old. Not only is he facing bullies at school, but his mother has terminal cancer, his grandmother is domineering and his father is thousands of miles away. But then, a 40-foot-tall monster arrives one night, towering over his bedroom window and changing his life forever.

It's a deeply poignant film, not least with the monster's design being one of the most fantastical and memorable creations to appear on-screen in recent years. MPC's VFX supervisor Ferran Domenech worked on *A Monster Calls* for almost a year to deliver the vision of director J A Bayona, with the rest of the team working from six to nine months.

Working in the MPC Montreal facility, Domenech led a team to deliver around 180 shots for *A Monster Calls*, with the work including close-up shots, transformation of the monster, dialogue shots, modelling the full body and sharing assets with other vendors on the project, such as El Ranchito and Glassworks Barcelona.

At the start of production, the monster's facial rig went through a concept phase for a couple of months with plenty of research and development taking place to establish just how MPC would add expression to it. "The monster was made of wood, which is obviously a hard surface that should not easily move," explains Domenech of the challenges in working with a talking facial rig. "We settled for a facial rig made of many interlocking pieces that would slide against each other without deforming. This was technically tricky to do, since the setup had to work and avoid collisions between the pieces, and it was also slow to animate when in full detail, but it gave the best final look."

For the transformation sequence, a yew tree is turned into the monster. Just like the facial rig, the yew tree was built up from broken pieces and Domenech explains why: "The yew tree was big enough to fit the monster inside it and as he stood up, he literally rips out of the canopy. As the pieces fall to the floor, the monster is revealed."

These shots would end up being the most testing for MPC, requiring the work of every single department in order to achieve the final result. The assets department would start with special breakable models, moving on to complex rigs from the rigging department, tricky choreographed animation and technical animation to add leaves moving in the wind and pieces falling from him, with many layers of FX dust, and heavy and complicated lighting renders all finally put together by senior compositing artists. "I would say that the transformation shots were definitely the most time-consuming shots to create and the most visually exciting," continues Domenech.

Beyond just the tree transformation, another, more angered version of the monster was also created with protruding bones and a flaming glow. "The 'angry monster', as we call it, was a variation of the standard monster that had extra





“The transformation shots were definitely the most time-consuming shots to create and the most visually exciting”

Ferran Domenech,
VFX supervisor



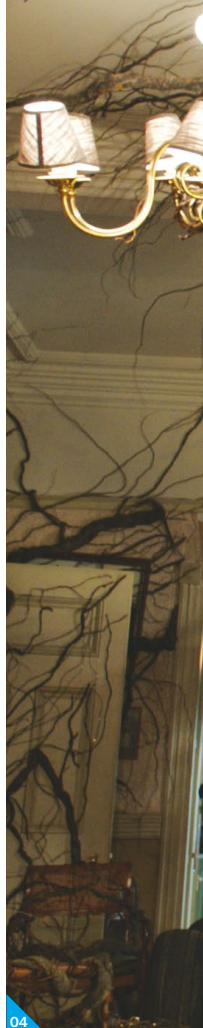
02



01 The assets team at MPC adjusted the wooden pieces to work for animation and augmented the facial structure so that the mouth, eyebrows and eyes could move

02 The performance capture production was a creative collaboration between director J A Bayona and Audiotion, headed up by MD Brian Mitchell

03 The monster is a 40-foot yew tree voiced by actor Liam Neeson, who spent two weeks with Audiotion to create the mo-cap work





Moving on from mocap

VFX supervisor Ferran Domenech explains why mocap couldn't be used for the close-up dialogue shots of the monster

The animation team used video reference of Liam Neeson to match lip sync, facial expressions and eye movements. "With the difference in size and proportion between a human and the monster, we found that using mocap was not that practical, as we would have to keep making adjustments for weight and also reposing to match the space and what was directed on each scene. So we opted for fully key frame body and facial performances."

controls to expand the muscles and open his chest. It could also change the shape of most of his facial wood pieces into sharper, longer versions."

The angry variation also had to enable the growth of branches for his body, and the team had to add extra branches where needed. "With all of these controls the animators could change him from normal to angry and back within a shot," says Domenech.

Other wood pieces would be modelled and textured across the whole body. The pieces would consist mostly of different types of wood, with the head, hands and feet created first using the on-set practical monster as reference. The rest of the body would be built from scratch, based on 2D designs and pictures of clay model references provided by the film's production team.

Tangled with branches and vine, the monster was then virtually brought to life with this wooden nervous and musculature system. "To get the body to move in a logical way, the muscle groups were designed roughly based on human anatomy, including tendons and fibres that would allow the arms and legs to move," reveals Domenech. "This was made of vines and greener pieces of wood that would slide under the outer layer of hard bark."

Other than the wooden texture muscle systems, another core element in breathing life into the monster were its human-like eyes, providing expressive cues throughout the movie. These were essential in providing a window into the monster's behaviour, all without losing its natural tree form.

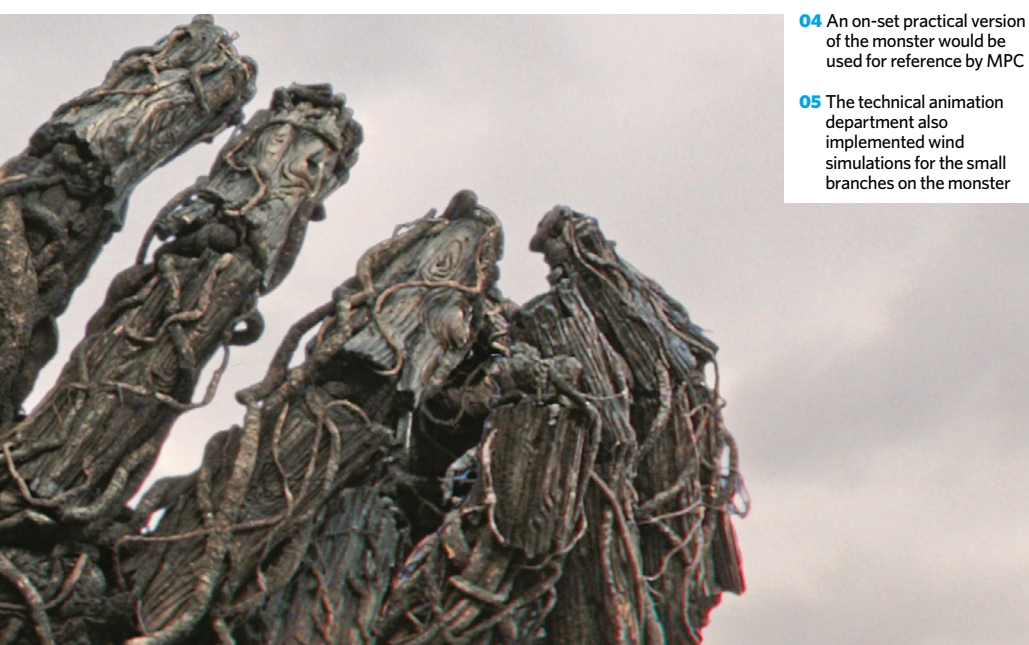
The moss that grows across the monster's body, for example, was used as inspirations for the colour of the monster's eyes. "The eyes had to communicate emotion," Domenech begins, "and some of the practical monster designs had very colourful and striking looks, but could also be too distracting for a talking performance. So we were asked to do a series of concept art designs with different types of eyes. In the end the colour scheme chosen had to complement the colours of the monster. The face is covered in small patches of green and yellow moss, so this colour range on the eyes was sympathetic to the design."

With this deep, emotional connection built from just the eyes and face alone, it comes as no surprise to learn that these formed part of Domenech's favourite shots. "I enjoyed the last shots in the film the most, where the eyes and the subtle facial performance of the monster play an important part in the story."



04 An on-set practical version of the monster would be used for reference by MPC

05 The technical animation department also implemented wind simulations for the small branches on the monster



Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month



01 Navá
by Oskar Füleki
3DA username

Visumetrie

Oskar Füleki says: "I was inspired for this project by a picture of an old antique kitchen. My goals were to create an atmospheric lighting situation and give the materials some realistic traces of usage."

We say: There's a really nice rustic feel to Oskar's kitchen render and we love how it's illuminated by that one stream of light coming in from the left-hand side of the image, creating a sort of early-morning atmosphere.

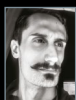


02 Elephant
by Dmytro Teslenko
3DA username

Dmytro Teslenko

Dmytro Teslenko says: "Hello, I wanted to show off a project that I'm very proud of - an elephant made in 3ds Max, ZBrush and MARI. Post-processing was done in Photoshop. I hope you enjoy it!"

We say: It's amazing how artistic an effect is achieved when you put something from the natural world in a studio environment. The thing that makes this elephant look so real, though, is probably Dmytro's fantastic sculpting work.



03 In the Cold, Cold Night

by Joaquin Kierbel
3DA username

jkierbel

Joaquin Kierbel says: "A sci-fi 3D concept made in my spare time. Mainly done in Blender, with World Machine for the terrain map and some Houdini for the spiral-style mesh."

We say: Abstract sci-fi renders are always cool, and adding a human figure being beamed up is a nice touch that adds a sense of scale that would otherwise be missing. The terrain at the base of the structure is impressive.



04 Alchemy Room
by Isai Ramirez Molina
3DA username

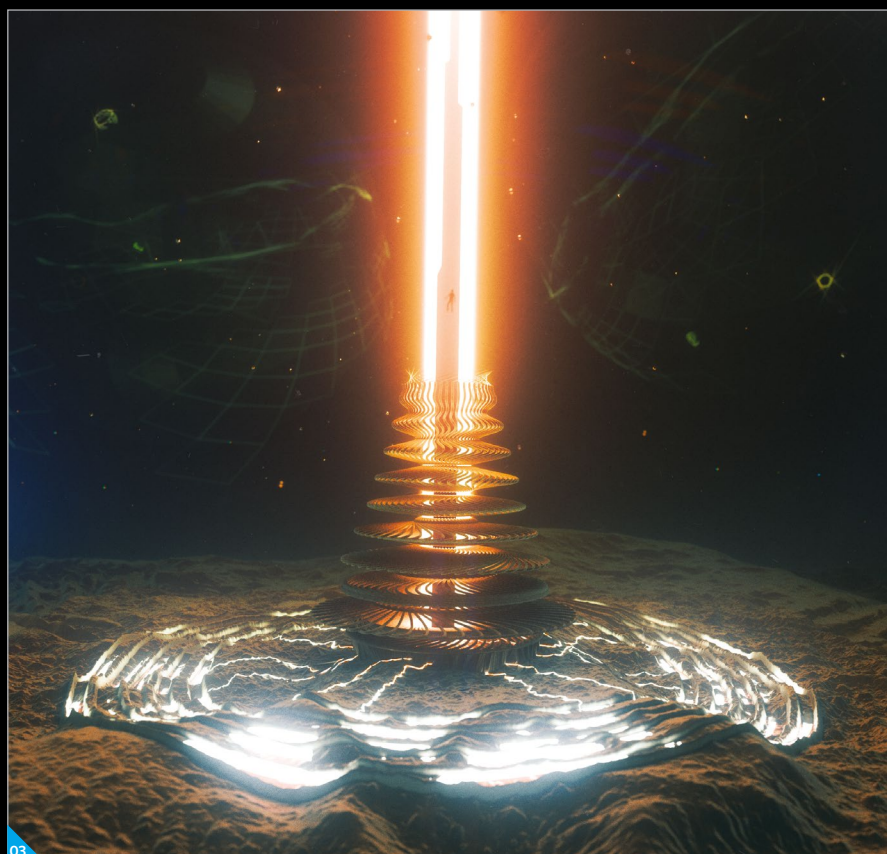
Isai Ramirez

Isai Ramirez Molina says:

"For this work I found inspiration in steampunk galleries. I modelled everything based on a sketch I did myself. In this project I used Corona Renderer, and used Photoshop for post-production."

We say: The first thing we thought was that this environment wouldn't look out of place in a BioShock game, which is high praise indeed! The individual details are superb and the unorthodox camera angle actually adds a lot.

Image of the month





02



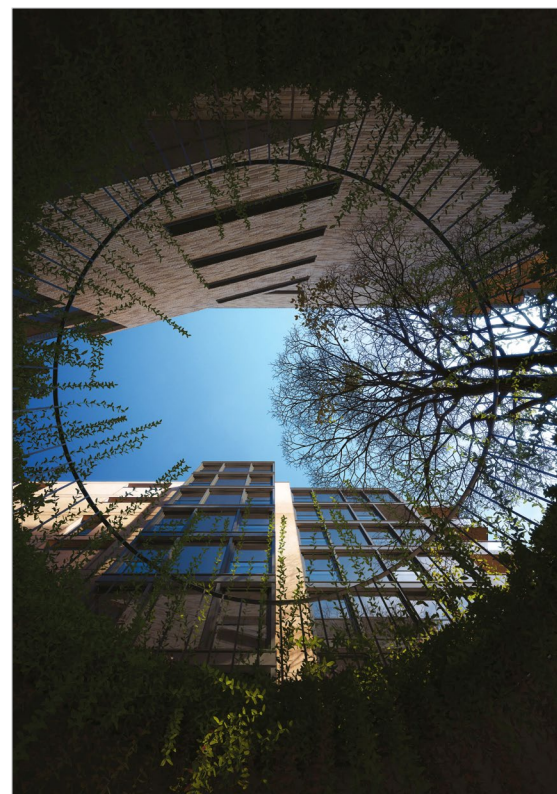
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Steampunk Pig by Mary Fazzolari
3DA username **Mary Shan**

Mary Fazzolari says: "Steampunk has always fascinated me. One day I was sketching some ideas and I came up with this character. It was looking very cool so I decided to give it a try with Blender."

We say: Mary's character render is so delightfully bizarre that we had to include it here. The cartoon proportions are spot on and we're big fans of his top hat and moustache combo.



Garden by Vic Nguyen
3DA username **VicnguyenDesign**

Vic Nguyen says: "Here is a project I did for an Evermotion 'Secret Garden' challenge in 2016. I wanted to express a special perspective that's perhaps a bit unusual."

We say: Looking at things from a completely different perspective can be so valuable if you're willing to experiment. That's exactly what Vic has done here, resulting in a really unique arch-vis render that easily stands out.

Technique focus

Incredible 3D artists take us behind their artwork

LIGHTING After detailing the model I then proceeded to light and texture using Corona Renderer. For the lighting I used one Corona light rectangle for the window on the right, and another fill light on the left. Always try to use photographs as reference for your lighting because it will give you a sense of direction on what are you trying to achieve.

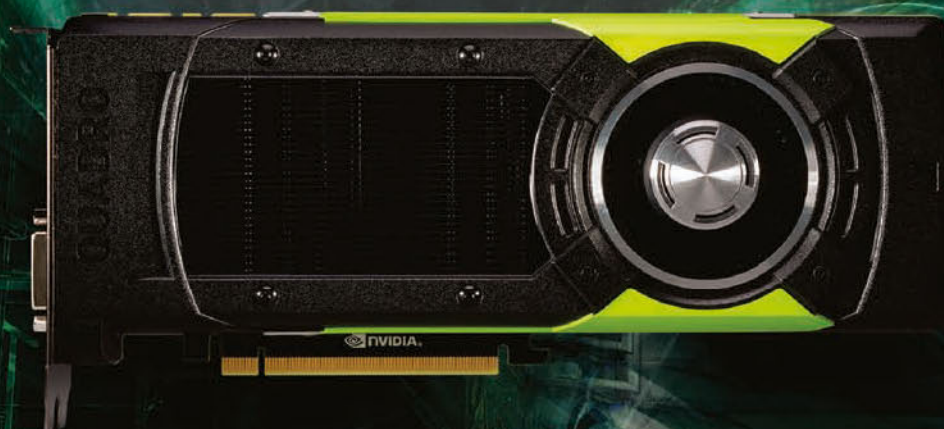


Peter Ang
dartofang.com

Peter is a senior 3D visualiser. His work has been featured in *Expose*, *Exotique* and *3D Artist* magazine

Software 3ds Max, Corona, Photoshop, After Effects, Frischluft
Cake Please, 2016





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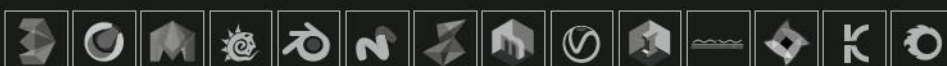


„Perfect World“ by Katie Melua | Directed by Karni & Saul © Sulkybunny

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