PROFESSIONAL COMPOSITING TECHNIQUES

The crucial last step in the VFX pipeline, compositors are integral in making state-of-the-art visual effects appear both authentic and tangible. 3D Artist got in touch with some of the top compositors in the world to learn more about their craft

"In this shot there wasn't much to originally work with, just a sky plate that we graded and then added more clouds to from a different plate. The environment team delivered to us a background to blend with the sky"

"We rebuilt the ship from all the secondary passes, then we matched the blacks and the highlights to the graded plate, and then used the depth pass to give the ship a greater sense of scale. The thrusters themselves came next"

"We then worked on the smoke and dust that really sells the interaction of the ship and the ground. Finally there was the lens flare. Overall this shot was completed in the space of about three-four weeks"

Doug Lamour, MPC's global head of compositing
"Compositing is the most photographic of the VFX arts, as in order to sell the final image as a 'real' image all elements must be brought together in a away which mimics a photographed plate. The simplest way to think about compositing is that its visual collage, or Photoshop with moving images!"

KYLE CODY
The Mill, NY

ZAVE JACKSON
Cinesite

CHRISTIAN KAESTNER
Framestore

CHRIS KNIGHT
The Mill, LA

ALESSANDRO SCHIASSI
Freelance

Professional compositing techniques

Escape Studios offers a fantastic course in Compositing For Visual Effects. Learn more about this hands-on course at www.tinyurl.com/3DAEscapeCompositing

PIECING THE PUZZLE

They may come in a the back-end of the pipeline, but compositors are utterly fundamental to selling the spell-binding illusion of VFX. Compositors are the jigsaw puzzle masters, slotting together the disparate elements supplied by many varied artists into one seamless whole.

It's a job that ranges from some of the most VFX intensive shots imaginable, with hundreds of separate elements, right down to simple green screen image manipulation. Some artists focus on the forest while others on the intricate veins of a leaf, but it's a compositor's job to oversee each detail and ensure that every pixel in every frame is flawless. So what's the sign of a job well done? It's when all this work goes completely unnoticed by the audience.

"Without digital compositing in the VFX pipeline, commercials and films would not have been able to advance visually in the last 30 years," states Chris Knight, head of 2D and creative director at The Mill in LA. "With more advanced technology, the software that we are using today has enabled us to create images that can genuinely deceive the viewer and produce images that we could only previously create in our vivid imaginations."

While the process has advanced massively in recent years, Zave Jackson, 2D and compositing supervisor at Cinesite – whose recent work includes *The Monuments Men*, *RoboCop* and *Skyfall* – reflects on the humble origins of compositing. "Georges Méliès' 1898 film *Four Heads Are Better Than One* employed matting techniques using blackened glass to limit which areas of the film were exposed," he says. "The film was exposed multiple times using different mattes, creating a composite image within the camera. The process evolved throughout the 20th century with the introduction of black screen and blue screen techniques to create travelling mattes. Matte paintings and pictures painted on sheets of glass were used as backgrounds and these are the humble beginnings of a technique that is still used in the digital world."

These days, most film productions will go entirely through a digital post-production process where every single sequence of the film is digitised. By doing this, filmmakers have complete freedom to modify and alter almost every shot in a film. Over the course of more than a century, what was once a simple A over B methodology has transformed into a complex and intricate art form of combining several hundreds of layers and masks over several thousand operations.

"Compositing is an art," says freelance compositor Alessandro Schiassi. "The role is extremely important in regards to giving flexibility to the entire workflow. By compositing, you are facilitating changes and tweaks. At the end of the day it's absolutely essential in creating and accomplishing the director's vision."

THE RIGHT TOOLS

Today, compositors all share an understanding of lighting, colour and composition. However, due to the evolution of technology there's a number of different ways to put a composite together. While artists are forced to adapt as technology and software continues to rapidly evolve, the principles and fundamentals of the process remain the same.

Kyle Cody, senior compositor at The Mill in New York, guides us through the fast-paced and precise nature of one of his recent projects. "While working on PETA '98% Human', in which we created a completely lifelike 100% CGI chimpanzee, we had dailies in the morning and then dailies again in the evening to review not only animation, but also lighting and compositing all at the same time," he details. "Because we were doing such complex and subtle animations, simply rendering out playblasts or greyscales wasn't enough to be able to feel the animation. So twice a day I would comp the new CG renders of the chimp in order to review it with the director and the team.

"After each of the dailies I would then work on finalising the comps and setting up the 3D compositing system in NUKE," Cody adds. "The compositing work on PETA was also very delicate in order to finalise the comps. A lot of artistic attention was given to the eyes of the chimp, while also drawing the viewer to areas of the frame with plenty of light, shadow and colour."

On a day-to-day basis, a lead compositor is not only busy with the organisation of shots and the edit, but also maintaining the artistry of the spot. The process differs between compositors but the bedrock of compositing is NUKE, though Cody mentions other software essential to the process.

"I am a lead NUKE compositor. However, in order to run jobs and maintain an edit I use Smoke on a Mac, known as SMAC, for all my timeline and editorial needs," he explains. "While on PETA I conformed all the various plates and elements on my SMAC. The whole edit lived here and could be viewed for client presentations or for dailies with the director or the team. NUKE, however, is where most of my time is spent. On PETA I had a 3D system set up in each of the comps – basically every comp was a 3D setup within NUKE. The back wall, the glass and the table were all elements that were projected onto geometry in NUKE, using the same camera used in Maya/XSI from the 3D team."

Christian Kaestner, compositing supervisor at Framestore, agrees. "At Framestore we've settled mainly on NUKE by The Foundry," he says. "It enables a very good integration into our pipeline and has an incredibly wide selection of tools that mean our artists can work very efficiently, even on very complex work. Its image manipulation tools are state-of-the-art and with its 3D capability, NUKE allows for element integration even on the most complex of shots."
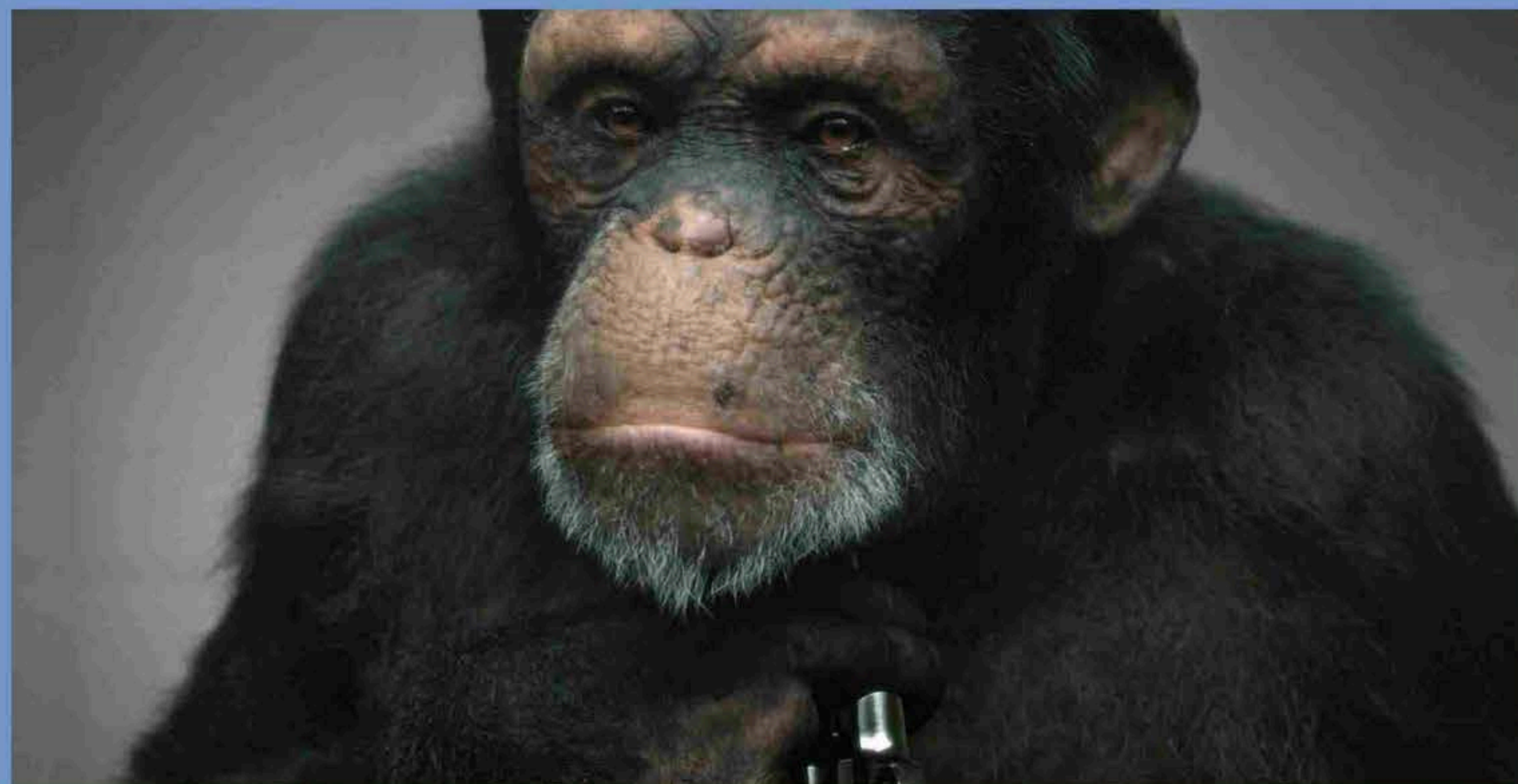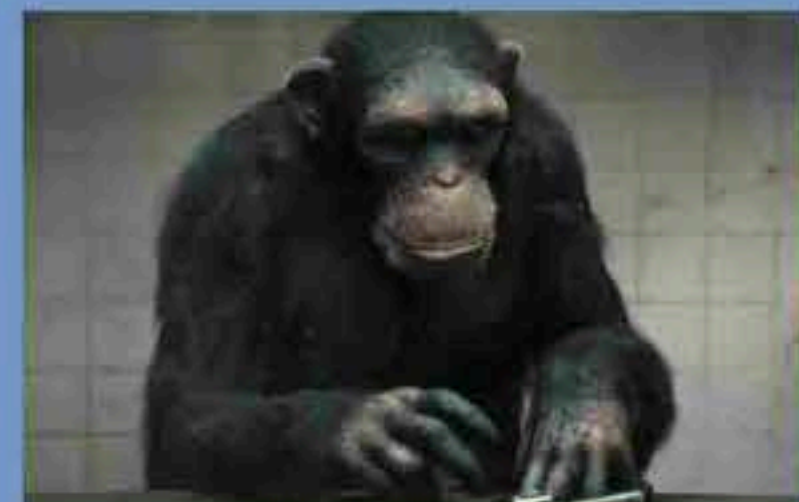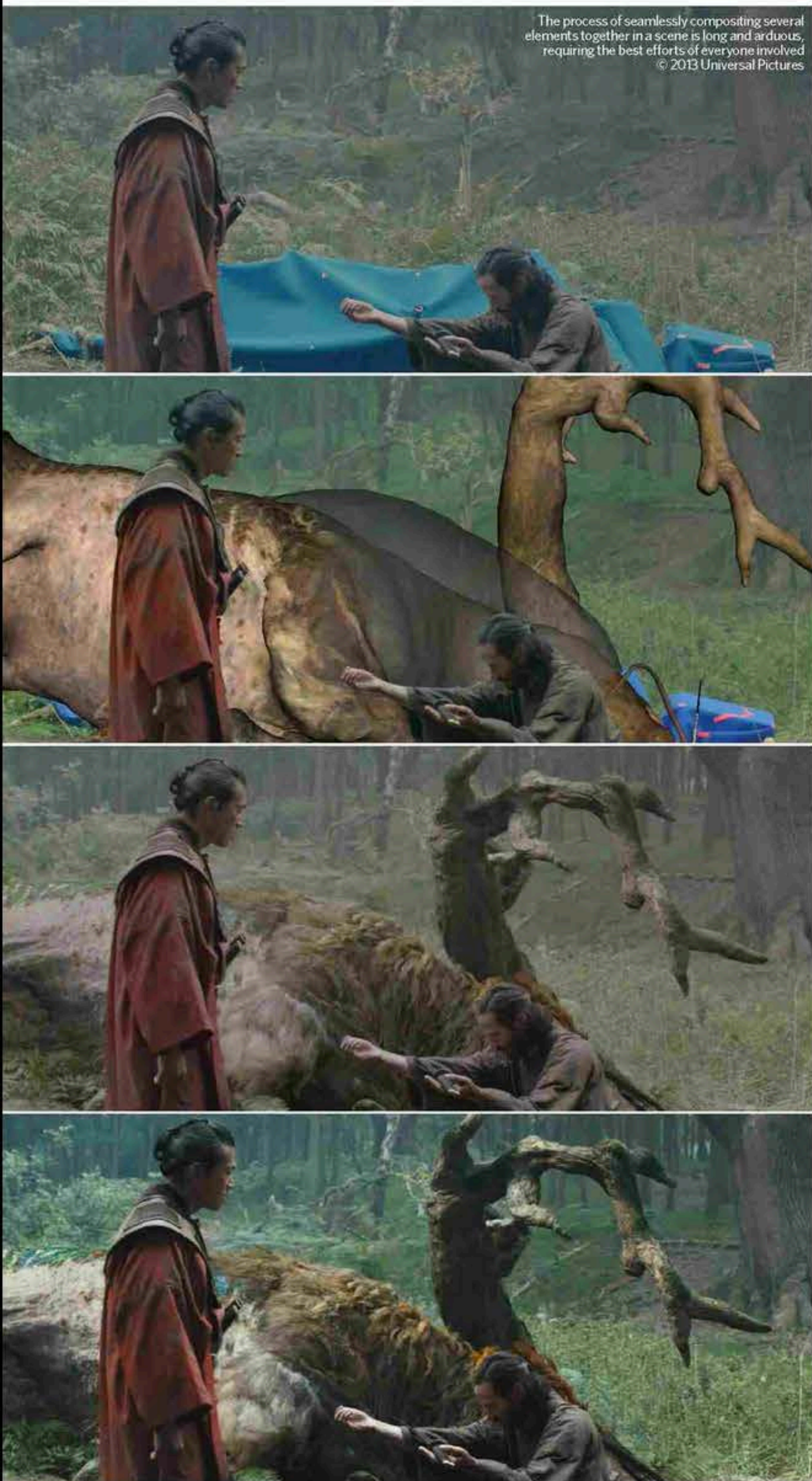

Footage

Diffuse, dirt, GI and lighting

Shadow

Colour matching
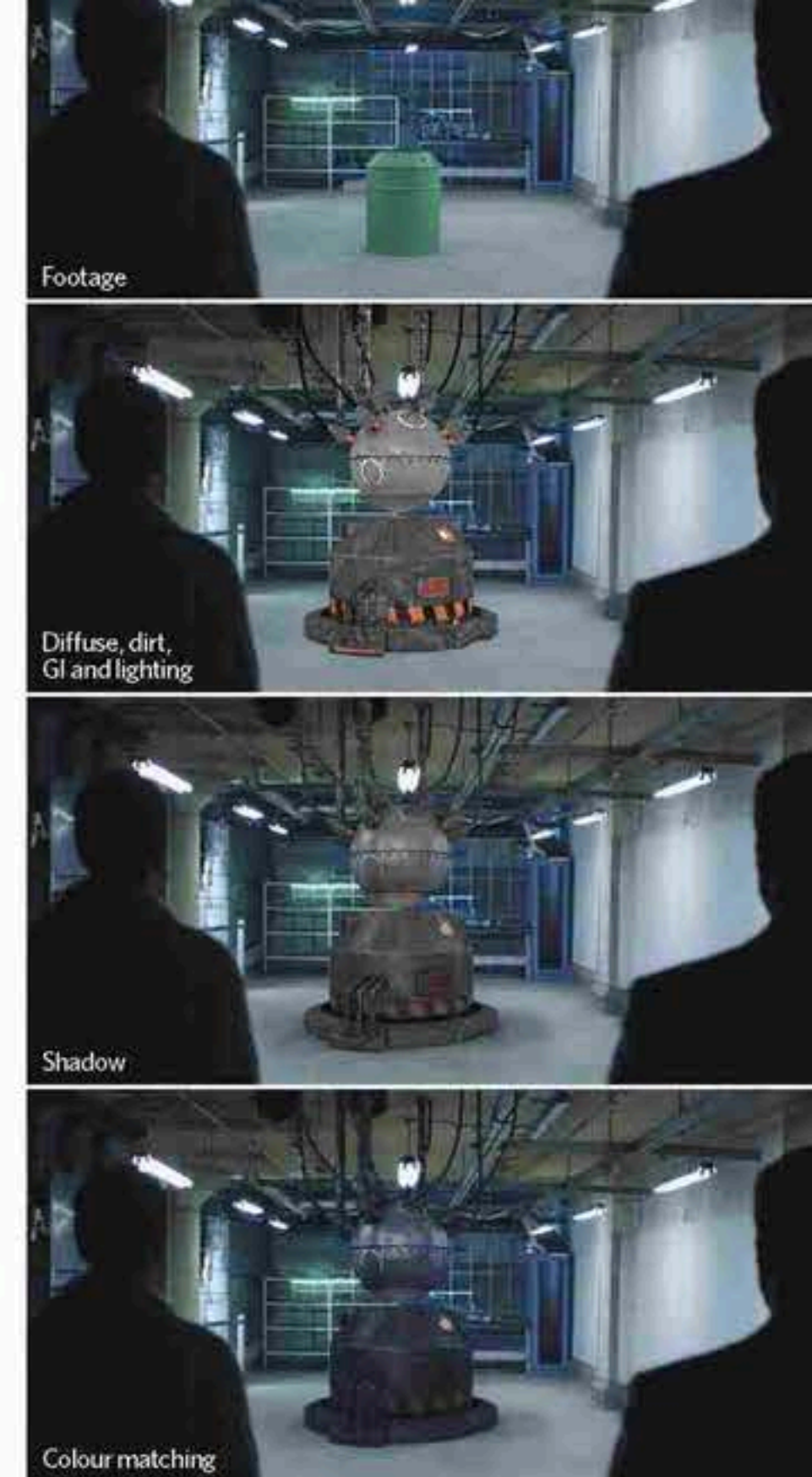
The process of incorporating VFX realistically into a scene requires professional compositing programs such as NUKE or After Effects

Tips from The Mill
The Mill's Kyle Cody offers a series of technical and general compositing tips

1) Imperfections make perfect composites No man-made image is ever perfect, so why would your composites be? It is the subtleties and imperfections in a composite that make it feel cinematic, emotional and real. Lens artefacts, flares, blur, defocusing, grain, or just plain colour and value variation are all things that will help bring your comps to life.

2) Without reference, there's no realism Before you start a composite you should always look at references. Nothing is more real than photography and video, so looking at things like exposure or colour in photographs is the first step to a successful comp. If you get stuck on why a comp doesn't look good, go back to your reference, maybe it's a reflection or the colour of a shadow – the answers are always there.

3) Matte and fill separation Always keep your matte and fill separate before combining them when you are ready to comp them. Creating your matte and your fill separately is also important for a successful comp. The sheer simplicity of that will ensure you have clean edges and a solid composite.

4) Colour theory This is fundamental for any compositor because colour plays such a huge role in both our emotions and in making a composite sit well visually. Knowing what colours to add to an image or knowing which colours are complimentary to make another colour stand out more are all relevant concepts in compositing. Knowing these will make you a faster and more efficient compositor.

5) Photography The key to making a successful image is always based around the principles of photography – composition, the use of light and shade, the use of lenses, frame rates and shutter speeds are all keys points in a beautiful image.

6) Film principles Knowing shot design, directing principles and editing fundamentals are also important when compositing. It will make you a better lead artist if you have a greater understanding of the bigger picture in a spot.

The process of seamlessly compositing several elements together in a scene is long and arduous, requiring the best efforts of everyone involved
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OVERCOMING CHALLENGE

"It may sound straightforward to combine elements with one another, but every shot brings its own challenges," Kaestner muses. "The process of compositing a shot may be similar, but the tasks are very different every day. On *Gravity* for example, the methodology was very similar for most parts of the film, though creating what seemed to be endless camera moves involved a lot of planning."

In this case Kaestner worked alongside entire teams of compositors that were purely responsible for the generation and look of the view from space, while others concentrated on the finer details of constellations and star exposure and yet another group worked on the interior design of the shuttle and the International Space Station.

"At this point, we still didn't have a single shot," adds Kaestner. "We had cameras and backgrounds, but the photographic plates of the actors still needed to be combined and merged together in very complex ways to eventually create the illusion of very long, seamless one-take shots."

It's fair to say that the day-to-day process of a compositor is hard to define as it differs so widely from one project to the next. For Schiassi, as software becomes increasingly advanced to a level where anything is possible, it's the close scrutiny of filmmakers that presents one of the biggest challenges for compositors.

"Directors are making any kind of change at any moment, so the main challenge is time," he says. "What used to be a locked shot could now get more reviews and we'll be asked to be improve it constantly, until the very deadline. What used to be 'how can we make it look better,' is now more, 'let's find all the mistakes!'

"An experienced compositor is able to spot what's wrong in a shot and fix it promptly," Schiassi continues. "However, often we get trapped in a looped shot quality control when instead we should focus more on the entire scene, how it flows and how it tells the story visually. Because at the end of the day, that's what we are doing – we are telling a story, not making abstract art."

THE NEXT GENERATION OF COMPOSITORS

As the demands of filmmakers and the expectations of the viewing public have increased over the years, it's never been tougher to be a compositor. Today, while compositing software can manipulate and combine literally hundreds of separately created images – creating scenes that simply wouldn't be possible otherwise – the key for young artists looking to get into compositing goes beyond just learning the tools of the trade.

"Anybody can learn how to use a tool but it is training your brain and most importantly your eye in how to use those tools that will make you a good compositor," says Cody. "Learning the principles of photography and film are key in achieving this. So is recognising a good composition; knowing what complimentary colours are and how to use them; how exactly to draw a viewer's eye around the
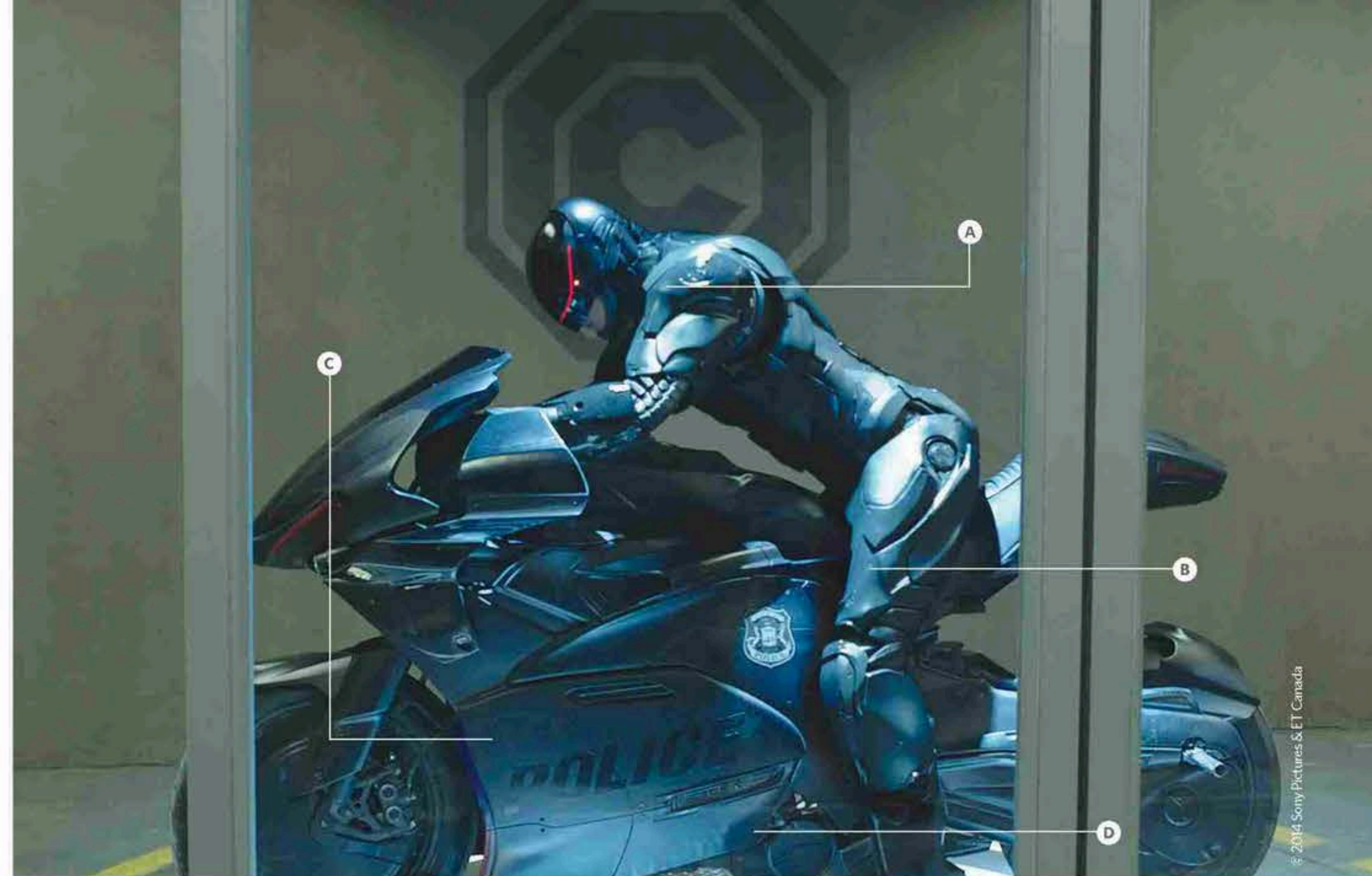
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Compositing improvements
Cinesite's Zave Jackson discusses his recent compositing work on *RoboCop*

A **Enter Robocop** "In this recent example from *RoboCop*, we have this shot that required a great deal of compositing alterations. Like many shots on this project, our task was to make improvements and modifications to the suit worn by the actor filmed on set to improve the general effect of the scene."

B **Body replacement** "RoboCop's head was working fine but we needed to add CG mechanics visible between his armour plating and slim the suit down a touch. Also, for continuity reasons it was necessary to modify certain armour panels. The approach taken was to do a full body replacement of the actor from the neck down."

C **Rebuilding** "What happened next was that the comp team created a clean plate that would entirely remove the actor. This meant rebuilding large sections of the bike. As we had geometry for this we used projection techniques in NUKE to project clean frames of the bike sourced from photography taken on set."

D **Final comp** "Warping was used to tweak clean patches of bike into alignment. We rendered using V-Ray and the compositor received split out components. The geometry for the bike came in handy again at the final stage as it allowed modified shadows from the CG RoboCop to be projected over the contours of the bike."

frame; and understanding the difference between a good and bad edit. All of these things will make you a brilliant compositor."

As with most disciplines in the world of visual effects, persistence is key, with much of a successful compositor's skill set being based around patience and a desire for perfection. "Good enough is just not good enough in the job of a compositing artist," enthuses Kaestner. "Most importantly though, I think people tend to underestimate traditional education in photography, fine art, maths and physics. These skills are essential if you want to become a good compositor. The experience of having taken your own photos on film - and even going so far so as to have developed your own film - will open your eyes to so many things that you will need to become a good compositor. There are no plug-ins or tools that will just do all the work for you.

Your life will become so much easier if you take the time to better understand the basics of photography and film stocks."

Schiassi agrees with this Kaestner on this point. "Learn photography and cinematography. Compositing is essentially the art of placing elements in a shot as they were in the scene during the shooting. You have to know how a lens and a sensor work in order to replicate the same values and artefacts that a camera, no matter how good it is, would create. So elements of photography, from framing, composition and colours to noise, lens distortions, and depth of field are subjects that you must be familiar with before even starting to learn any graphic software."

"If people critique your work, you should always listen to their opinion," concludes Cody, explaining that compositing is not just about understanding

the craft, but graciously accepting feedback from others while also trusting in your own artistic instincts. "Sometimes they will be right and sometimes they will be wrong, but regardless of this, you should always listen to people's opinions before making your own decision, because ultimately you are the artist."

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> **Kyle Cody, The Mill**