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**SPICE:  
LONG DIVISION**

There was more than just a freakish story behind Vincenzo Natali's horror film 'Splice', dealing with genetic engineering. The facial animation and opening sequence used special techniques to produce effects that are both beautiful and unnerving.

The specialist team at Image Metrics used their proprietary facial rigging and animation system to provide 128 seconds of animation for the face of the young Dren character in 'Splice'. Christopher Jones, Performance Capture Supervisor at Image Metrics and Project coordinator for Splice, lead the team, working on a rig for the cheeks, eyes, eyebrows, forehead and ears only of this unusual character. The lower half of her face and her body were live action. Working with the model and rig the film's VFX team had built, Image Metrics's job was to provide detailed notes and information advising the artists how to refine and tweak their rig.

**TWO FACES**

Director Vincenzo Natali spent time with both teams, discussing exactly what he was looking for in their work. As reference and context, he gave Image Metrics the footage that their animation would be incorporated into.



To create the young Dren, footage of the actress who plays the adult Dren in the film was captured at Toronto's CORE Digital studio in Toronto in a one-day capture session with dramatic differences to regular motion capture. The character was unusual in that the movements of the facial rig were to come from the actress playing the adult Dren, Delphine Chanéac, but the animation would be applied to the performance of another actress.

At the CORE studio, they met with Delphine and Vincenzo for a reverse ADR, automatic dialogue replacement, session – that is, they played back the footage of the young actress shot earlier, and instead of recording the audio as well, recorded video only of Delphine playing the young Dren, capturing facial expressions.

Vincenzo worked with her to emphasise that top section of her face as expressively as possible to emote with her eyes, eyebrows, and forehead to portray the little girl. It was a strange experience for her and for Vincenzo, neither of whom had ever done any similar kind of scene. Image Metrics captured the work with a Panasonic HVX200 camera, digitised the footage and left it with CORE to cut and deliver back to them.

For the first pass of animation, Image Metrics's proprietary algorithm analysed the performance of the actress from the video, collating all the different movements of the face and translating them into a neutral data set that they could re-target onto the rig itself. Her movements are put, one-to-one, directly onto the rig. Because the rig was so drastically different to the actress' real life head, Image Metrics did have to set some relationships and do some re-targeting. But once they had established some key poses, they could set animation curves that move just like the real actress.

Because the Image Metrics team – and the actress – were working to footage shot months earlier and trying to replicate

it months later with a different actress' body, a disconnect was evident that couldn't be bridged digitally. This is where their system adapted well, because it allowed them to hand key the animation on top of the animation curves. Apart from Image Metrics's proprietary software, they used Houdini and hand animation to achieve their effects.

This way they could work with Vincenzo and CORE on dailies – by internet feed, video chat and Quicktime files that all parties could draw onto as they talked. This communication gave greater insight into Vincenzo's vision that allowed tweaks to the timing and emotional intent. Especially in scenes when the young Dren fell ill, for example, Vincenzo wished he had asked the actress to further emphasise the coughing and other signs of illness. Image Metrics could go back and tighten up her eyes and enhance other expressions. Sometimes they had to work through 6 or seven passes to refine these.

Image Metrics also helped evolve the rig itself when it failed to achieve an expression Vincenzo was aiming for. They sent notes back to the riggers such as, "Add creases here up into the eyes and eyebrows, develop these shapes here," to get the performance and intention across.

**ORGANIC OPENER**

During the film's opening sequence, the viewer finds himself moving rapidly along the surface of a strange, alien skin. The VFX and 2D/3D animation studio within ChezEddy, a production company located in Paris, spent five months on the project, which required creating a liquid environment using fluids and particles and specific camera movements.

The camera moves along between 1mm and 5 cm away from the surface, which meant continuously regenerating millions of particles, about 80 million in total. They also needed to work the actors' names into the skin in an organic style using very high definition skin textures, rendering each cast member's name in a different style with a different approach.

Their references were more technical than artistic, so they did various tests and research to finalise the design. "Using reference images, we tried to understand the physical properties of each type of skin we had to render," said VFX Supervisor Jean-Charles Kerninon. "Once we had successfully reproduced various types of skin, we looked for the best way to incorporate the titles. Each title had to integrate seamlessly into the skin while remaining readable, and not feel superimposed but be part of the skin.

Throughout the single, three-minute shot, the CG camera moves on one path, precisely paced from start to end. "We were very aware that, due to its proximity to the skin, making a change on the camera's path, whether in space or in time, would have consequences on the whole timeline," said Jean-Charles.

"We used Maya to create basic models and Mubdox to add details to them. Procedural shaders were used extensively for the textures, combined with textures painted in Photoshop. The camera animation was done in Maya, as well as the



floating particles. Everything was rendered with mental ray and composited in Fusion.

The sequence was carefully storyboarded but wasn't explicit enough to plan the camera moves on the timeline. "We had to define it with a CG previsualisation. I think that was the longest part



of the project. The two directors, Kook Ewo and Vincenzo, were very involved in the CG process. Each animatic we made with Kook was then presented to Vincenzo to get his feedback. During the last month of production, Vincenzo was in France and spent a lot of time with us. It was a real pleasure to work with these two talented directors."

The main lighting is fairly simple. "We wanted to simulate a light attached on top of the camera, but we often had to cheat because of areas needed to be lit at various distances from the camera," Jean-Charles explained. "Using CG lights that mimic the physical properties of real world light sources, we animated light intensity over time according to the distance of what we wanted to show. We ended up with a rig of several lights linked to the camera, plus others located in various places of the set.

Jean-Charles said, "The particles also needed a lot of time, especially trying to let them flow naturally around the foetus and react to the camera moves. It was an ambitious project to render. We used a lot of displacement mapping and, as the camera was very close to the skin during the three minutes, we had to drastically optimize the render settings.

"Rendering time was not that long, actually, but compositing was much heavier and more complicated. We had lots of layers to keep the flexibility we needed to fine-tune any detail for the directors during the compositing stage."

