AUTODESK. UNIVERSITY

ECHO's Time Displacement: Storytelling Inspiring Technology and Vice Versa

Victor Perez

Director & VFX Supervisor | in @vctrprz

About the speaker

Victor Perez

Multi-award-winner film director, screenwriter and visual effects artist with more than 20 years of combined experience, and has worked on a number of Hollywood films, including ‘The Dark Knight Rises’, ‘Rogue One: A Star Wars Story’, ‘Harry Potter and the Deathly Hallows’, plus many more.

https://www.youtube.com/watch?v=Kq9n58zeZyo

Watch the Trailer on YouTube

https://vimeo.com/312070207

Watch the Virtual Cinematography of ECHO on Vimeo

The Story behind the Story

Stiller Studios (Stockholm, Sweden)

Founded by Patrik Forsberg, Stiller Studios is an award winning production company, with an objective to develop and produce quality film and series that make kids grow smarter, stronger and kinder utilizing game-changing proprietary technology and a world-class network of creative talent.

Tomas Tjernberg

Motion Control Supervisor

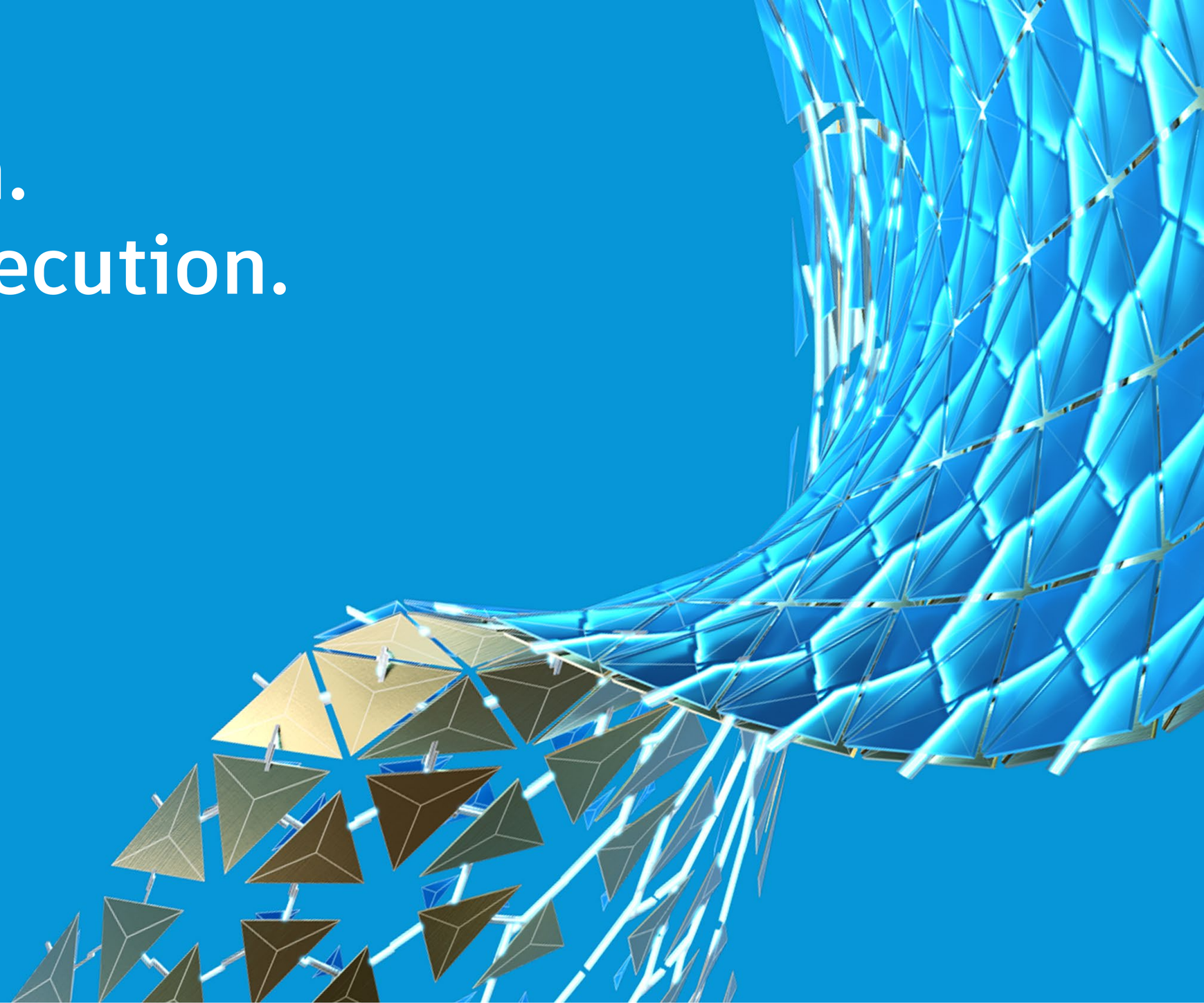
Tomas Wall

Visual Effects Director

I Love to Use Technology to Tell a Story, Not the Other Way Around.

VICTOR PEREZ

Simple Idea.
Complex Execution.



Time Displacement

Detaching Time of an Action Maintaining the Coherence of the Reflection Angle

The image in the reflection of the mirror is out of sync in relation to the main action of the main camera. It was technically possible thanks to the combination of different elements of technology and technique: 2 motion control rigs and an entire studio replicated in 3D within Maya (including both motion control rigs).

The Virtual World On Stage

The key of the design of the shooting was being able to replicate on set, at the greenscreen stage, a virtual 3D replica of the 3D scene at 1:1 scale so the actual cameras could replicate the movement of the 3D virtual cameras in Maya

Cyclops

High-Precision Cinebot, motion control camera rig.

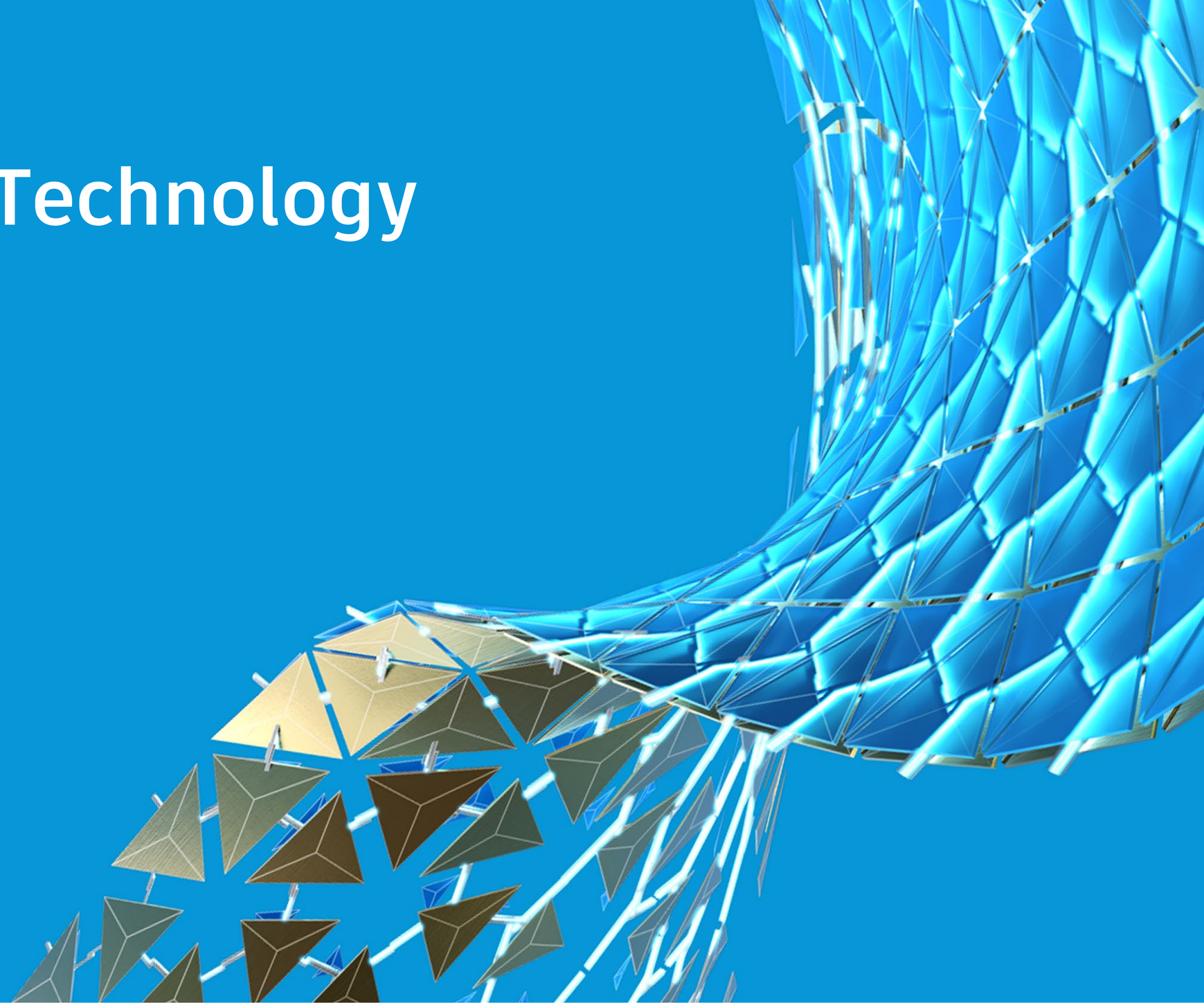
Bolt

High-Speed Cinebot, motion control camera rig.

https://vimeo.com/469775868/9738feb3c4

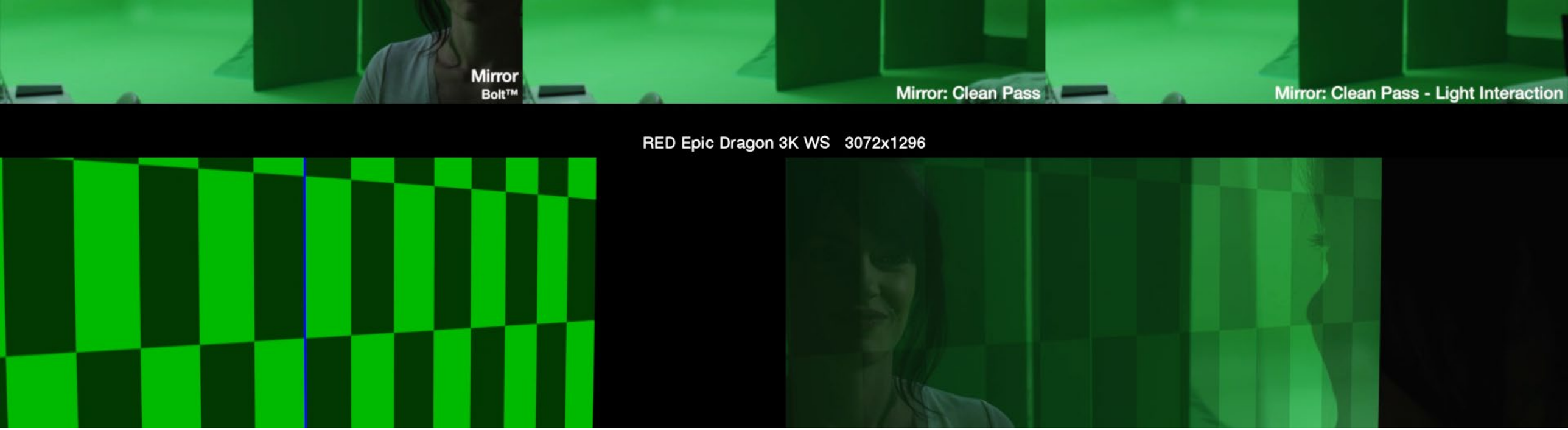
Watch the Filming a Scene of ECHO on Vimeo

Pioneering Technology



The Problem of Pioneering is Finding Your Own Way. So What's the Problem?

VICTOR PEREZ



https://vimeo.com/469777238/ed1d551407

Watch the Plates & Time Displacement Test on Vimeo

How Do You Light That?

Technically lighting a greenscreen to be shot contemporary in 2 directions at 360 degrees

- **Marcus Dineen, Director of Photography had to:**
  - Design a lighting that represent the light that will be applied later in post. For internal and external lighting simulation;
  - Create an environment evenly lit for a good greenscreen key, for 2 cameras, covering the rigs with greenscreen panels –without projecting shadows;
- **Cameras wear a green collar to cover in green everything behind the lenses:**
  - It created wind-resistance

The Most Difficult Part Was Trying To Explain How We Were Going To Film It.

VICTOR PEREZ

Features

GREENSCREEN WITHOUT MARKERS AND CLEAN PASS

As camera tracking is not required as we had the virtual cameras no markers were placed on the greenscreen, that facilitates the process of compositing.

VIRTUAL CAMERAS DON’T SUFFER THE EFFECTS OF PHYSICS

One of the mismatches we had in the reflection image was the vibration of the camera when movement was too fast with a sudden stop (specially in highspeed). Cyclops was rocksteady, the Bolt wasn’t anchored to the ground to allow mobility and that created mismatch issues in certain frames

LONG TAKES WITHOUT CAMERAMAN

During the shooting it all relies on the ability and precision of the actor to maintain the space marks at a certain time, no corrections were possible during the actual shooting as the cameras were automatic.

Features

AT 1/192 OF A SECOND YOU HAVE NO MOTION BLUR

The cameras shot at 1/192 sec. shutter speed for the frame triggering to operate and frames didn’t suffer distortion of motion blur to allow the stabilization and correction of position to be allocated in post. So all motion blur you see on the final film was created digitally: layer by layer to avoid motion vector estimation artefacts.

CAMERA MOVEMENT CONSTRAINS

The arms of the motion control rigs have their limitations, so you must play with it in mind, but having the 1:1 scale virtual set we could change the position of the real bed and turn the virtual environment to allocate any position of the rig we wanted to accomplish. Literally rotating the real studio over the Z axis.

STICHING

We had the opportunity to film every shot in various chunks, but we wanted to take the expressivity of this setup to the most complex and articulated technique, so keeping all in one shot at once. But the truth is the motion control replicates the position every time so stitching two different takes would had been possible.

Rendering: Maya + Arnold

Every environment was completely accomplished. The Mirror frame was always separated. The Grass was rendered using Deep Image for slicing the elements of the Footage. Every element was rendered with this passes.

- **Light Components**
  - Beauty (with Alpha)
  - Direct Diffuse
  - Indirect Diffuse
  - Primary Specular
  - Secondary Specular
  - Direct Specular
  - Indirect Specular
  - Reflection
  - Refraction
- **AOVs**
  - Depth (Z) 32-Bits
  - Normal World (N) 16-Bits
  - Position World (P) 32-Bits
  - Motion Vectors 16-Bits
  - Object ID 16-Bits
  - 16 mattes per file: normalised R, G, B
  - Shadow 16-Bits

42 Tb of Files From all Kind of Sources Composited in One Single Computer

For 7 Minutes and 22 Seconds of Film

TIMELINE

WRITING

1 DAY

The story was very clear from the beginning. The script is merely 3 pages long and the action spread in only 5 scenes.

PREPARATION

2 MONTHS

Rehearsals with Maria Ruiz (Actress) defining the choreography and studying camera movements to create actions and reactions in the displaced time of the actions reflected.

SHOOTING

22 HOURS (IN A ROW)

Shooting 5 long takes with an immense amount of factors that we had to figure out on the fly. (The availability of the Stage was 24 hours).

POST

2.5 YEARS

The postproduction of the visual effects was executed mainly by friends in their spare time, located around the world. Around 80 people involved. The first batch of 3D CGI renders took 8 months to get completed... and due to an error, it was re-render entirely from scratch.

Everything Composited in one single computer.

CGI by Numbers

11,738
FRAMES

Every single frame of the film has CG and has been shot over green screen

3K
FILM FORMAT

Shot on RED Epic Dragon 3K Widescreen with a 18mm lens @24fps - 1/192 sec. exposure

32K
ENVIRONMENT MAP

Animated Digital Matte Painting for the External Background

x2
REFLECTION

Every Task During Compositing Was Done Twice: One for the Main Camera, the Other for the Reflection

What I Have Learned During This Journey

It was supposed to be a quick test to have fun trying a new technology. It ended being a pioneering experiment of storytelling with the use of technology at the service of a story.

Photo credit goes here

Now Showing: ECHO

https://vimeo.com/232663710

Watch the Full Film on Vimeo