Panocam and Postvis For The Chicago Chase in Jupiter Ascending

Tom Proctor   Christopher Sweet   Kyle Goodsell   Daniel Rauchwerger

Double Negative*

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Abstract

Double Negative's VFX work on Jupiter Ascending included the Chicago Chase sequence, in which Caine and Jupiter are pursued through the city by the alien Keepers. The directors wanted to base as much of the sequence as possible on pre-dawn photography: for some wide shots, stunt performers would be dangled from helicopters and flown through the city, but for shots which would show the talent, or the helicopters could not fly safely at speed, a multi-pass approach was required. Foreground plates of the actors on wires were shot on a greenscreen. A custom multi camera array called the Panocam was designed and helicopter-mounted to capture backgrounds with high resolution and wide field of view. In post, the array images were stitched together and both layers of photography were tracked and extensively recomposed and retimed, and composited with CGI and FX to create the final shots.

1 The Panocam

Pictorvision designed and engineered the Panocam, with Double Negative providing tests and visualisation. The design goals were: maximum field of view, high resolution, and compact enough for use in a helicopter mount. Eventually the design settled on an array of six Red Epics in a toe-in configuration with Canon 21 mm lenses. The stitched image had a 140 degree FOV. By reprojecting the stitched array we can make a moving extraction on a longer lens. Our in-house photostitching tool allowed us to automate solving the relative positions of the cameras, delensing, and generating 2k stitched sequences for our matchmoving department. Principal photography was shot on the Arri Alexa so a custom color matrix was used to match the Red to the Alexa, with tweaks in the composite.

*e-mail:{tmp,cws,keg, dlr}@dneg.com

2 Matching the Previs Action

Although the characters had to appear to be moving great distances at great speed during the chase through the city, on the greenscreen stage the distance of travel was limited. The gross camera movement of the flight was abstracted from the local movement around the actors with a crane closely matching the previs camera move relative to them. Practical lighting and fans helped sell their travel. Previs camera moves were transposed onto maps of Chicago to help the helicopter unit plan their flights. For shots flying over and under bridges along the river, passes were shot from the helicopter and a barge. A raw monitor feed from the Panocam provided backgrounds for mock-up composites which fed the edit and helped inform conservative selects.

3 Postvis Workflow

The mock-ups used simple 2D transforms on the backgrounds and foregrounds but for the final shots with all of the spacecraft, Caine's boot trails, weapons fire, and destruction effects, everything would need to sit together properly in 3D space. Postvis was task of sanitizing the layout of the foreground and background cameras and geometry to sit together and match the action of the mock-up. The key to a convincing composition was to reapply the gross camera move of the flight through the city as an additional transform to the foreground camera, parenting it to the matchmove of the Panocam and filming it from a synthetic shot render camera. Additional transformations and retimes were added to tweak relative positions of the characters, and the shot camera was often further animated to add energy to the sequence or respond to the animation of the spacecrafts. This was a highly iterative process. For the river shots, we merged aerial helicopter plates with barge plates by aligning and retiming the cameras to find transition points which were as close as possible and projecting onto Lidar data of the city.

4 Finished Shots

With the postvis providing a robust base for shot work, animation, lighting, FX and comp could proceed in a traditional manner with a minimum of fiddly cheats.