Case Study: Building CG Clouds for *Amelia*
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Creating believable CG clouds is not easy, and key scenes in *Amelia*, the film biography of the pioneering aviator Amelia Earhart, called for demanding visual effects sequences with CG aircraft flying through dramatic cloudscapes. The team at Mr. X enthusiastically took on the challenge.

“At the start of the project we had various discussions to determine what type of cloud solution was required for *Amelia*,” said Jim Price, Technical Director at Mr. X. “Because the some of the shots were 100% CG with the camera flying through the clouds, matte paintings and sprite based approaches were ruled out in favour of a more functional solution. We decided to construct our cloud using 3D volume primitives, which would allow us the flexibility to change animation and camera positions at any time with minimal impact to any work that had already been completed.”

For visual reference, the team at Mr. X assembled photomontages of iconic, “hero” clouds. These would serve as the style frames for the artists, providing visual cues for the position, texture and lighting of the clouds.

The first step in the cloud shot pipeline was blocking. The previz team created cloud layouts in Maya using placeholder spheres that would represent the cloudbanks from the sequence style frames. Cameras were also animated during this stage and any gaps in the cloudbanks were filled with additional placeholders.

Once blocking was complete, the spheres were replaced with polygonal models matching the desired profiles of the clouds. When these were approved, the surface shapes were passed on to the VFX team to be converted into true volumetrics.

“The VFX team’s first step was to bring the polygon clouds into Houdini and voxelize them,” said Price. “Then procedural volume shaders were used to provide finer detail by modifying the density within each cloud.”

The VFX team also handled lighting for the clouds and applied additional effects such as lightning and rain. The clouds were then rendered in Mantra using multiple passes and light layers. “Rendering cloud elements out by depth and by light allowed the compositors total freedom to control the colour and density of the clouds and minimize expensive re-renders,” explained Kyle Yoneda, FX Animation Supervisor who has been with the team at Mr. X since 2004.

“Perhaps the biggest challenge was the fact that volumes take significantly longer to render than standard surfaces,” explained Yoneda, “so we had to develop fast preview techniques in order to get visual feedback at every step, rather than having to perform long test renders.”

Texturing and lighting atmospheric volumes called for a very different workflow from traditional geometric surfaces. “Years of old tricks and cheats no longer applied, so new workflows and methodologies needed to be developed,” explained Price. “Since the toolset had to be developed in parallel to shot work, it fostered a strong collaborative pipeline between the TDs and the FX Artists. The artists would inspire the TDs to create tools that would allow for greater creative freedom, while at the same time, the FX artists were always willing to try out experimental techniques that the TDs concocted.”

The result of all this hard work is a series of stunning aerial sequences through nighttime cloudscapes, dramatic highlights in the film itself. *Amelia*, directed by Mira Nair and starring Hillary Swank, Richard Gere and Ewan McGregor, opens in North America on Oct. 23, 2009.

Mr. X Team on *Amelia*
VFX Supervisor; Wojciech Zielinski
Technical Director: Jim Price
FX Animation Supervisor: Kyle Yoneda