Feathers for Mystical Creatures: Creating Pegasus for *Clash of the Titans*

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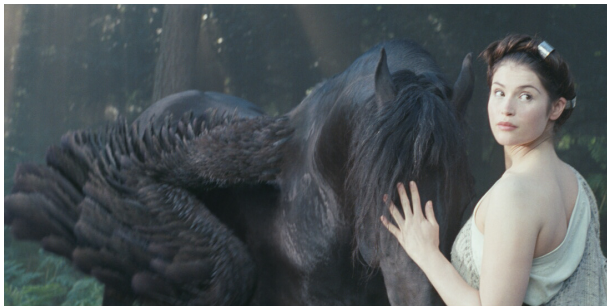MPC

Figure 1: *Final rendered image ©2010 Warner Bros. Pictures*

Figure 2: *Final rendered image ©2010 Warner Bros. Pictures*

Abstract

One of the major challenges for *Clash of the Titans* was to develop a highly sophisticated feather system used on several flying characters in over a hundred shots. The system had to reliably provide photo-realistic results over a large range of detail levels from characters in the background to those passing just in front of the camera. The feather system was tightly integrated with MPC's existing pipeline and allowed for a large amount of artistic freedom and control efficiently, while requiring almost no technical background to use.

1 Feather Designing

The foundation of the feather system's high quality had to start with the initial design of individual feathers. It was essential that these feathers had to look realistic even very close up. To achieve this each feather barb was procedurally created as curves in full unrestricted three dimensions. This approach allowed these 'fluffy' feathers to render with a full sense of volume.

Fortunately there was already an advanced system for creating styled curves in the form of the 'Furtility' fur/hair creation system. A feature was added to distribute fur on curves. This system allowed the groom artists to design feathers with the same powerful and flexible tools used for complex hair grooms.

These feather templates could be used to create a infinite set of feather variations at render-time allowing every feather to be different.

2 Feather Distribution

Additional targets were added to the the fur system that allowed the distribution of feather templates on polygon surfaces using existing hair grooming tools. Feather distribution could use a variety of methods ranging from highly automated distribution to bespoke individual feather placement and sculpting. Tools were created to allow feathers to quickly align to surfaces, twist and stretch using control texture maps. These maps were created by the MPC 3D painting system. Weight painting was added to the painting system to allow additional flexibility in style selection.

These feather distribution tools allowed the grooming artist to work with real-time visual feedback with a selection of visualization options using actual feather designs. This previewing would actually match the final renders.

3 Animation and Dynamics

The animators rig used a simple NURBS plane as a substitution for feather wings. This surface was then substituted with feathers at render-time, where additional procedural secondary animation could be applied for wind effects.

For hero shots a technical Animation rig was used to allow a pass of dynamics, additional animation and tweaks which allowed the adjustment of proxies based on the actual feathers.

4 Rendering

Due to the vast amounts of geometric data required to create such detailed effects, all feathers were created at render-time in a custom highly efficient multi-threaded PRMan DSO. In this process only blocks of feathers being rendered currently were generated and retained in memory at any one time, allowing each resulting final Pegasus render to contain tens of millions of curves.

As only a compact set of parameters and maps were saved on disk, they could be reinterpreted at any LOD (level of detail) at render-time, tailored for each shots requirements using a simple slider. Additional automated LOD control would alter detail on a per feather basis based on the distance from camera and amount of motion blur.

The feathers used a modified version of the existing advanced hair shader. While occlusion was traced against polygonal versions of the feathers generated automatically at render-time.

5 Summary

The *Clash of the Titans* feathers presented many new and unique challenges that tested every part of our software to the limit. To achieve the high standard of work required in the short time-frame it was essential to build on existing tools and pipelines in ingenious ways, to guarantee the fast delivery of high quality work whilst still allowing the artist creative freedom and tool familiarity within the their shots.

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