Blizzard Entertainment – Diablo 3 Cinematics Wing Effects

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Figure 1: Diablo 3 stills of *Imperious* (left) and *Tyreal* (right)

Introduction

For Blizzard Entertainment's *Diablo 3* cinematics, the archangels *Imperious* and *Tyreal* possessed wings that were an extension of each character's actions and mood. The fire and celestial wing effect concepts augmented the animation of the wings and reflected each angel's personality. A system was designed to allow for minimal use of disk space, simulation cycles, and artist time. *Imperious* alone had 44 individual feathers that comprised his wings.

From Concept to Production

The need for predictable fire effects required a more traditional particle and geometry centered solution, thus avoiding simulated fire elements. Pre-baked out sequences of particles were used in lieu of running costly fire simulations. For *Tyreal's* 16 blue celestial wing feathers, each was a combination of 12 passes. Between each undulating feather segment, there needed to be a thin veil webbing to augment the look and presence of the wings.

Preserving the Animation

Both angels sets of wings were animated within Maya and those resultant polygonal structures were procedurally converted to nurb surfaces and curves within Houdini. The surfaces and lines became the foundation for all the subsequent effects passes. The surface provided a normalized domain of 0 to 1, correlating from root to tip of each wing feather segment. This surface mimicked the original animation and allowed a defined zone for the baked-out particles to traverse.

Millions of Particles

For *Imperious*, a particle sequence with interesting ebb and flow motion was generated moving through a velocity field using FumeFX. These particles were deformed from their original path to move along the shape of the wing from root to tip. The particles served as the base element along with 13 other elements for each feather to generate the final look. When composited in Nuke, the particles and curves combined, forming a fiery look that was sought after in the concept art. To cover each of *Imperious's* feathers with particles, the particle count ranged from 1 million for the shortest feathers, to over 5 million for the longer, hero feathers. Copies of the original particle sequence were placed along each feather span at render time. Each copy sampled different starting frames of the original sequence, negating the need to run individual simulations for each feather.

Figure 2: *Imperious* wing element sample passes.

From Pre-Baked to Sim

As the production evolved, the *Imperious* wing effects were required to flex and react to movement. By factoring in the velocities of the original wing animation, the pre-baked particles were allowed to flex along their path to mimic lag and follow through. The pre-baked particles were also converted on a point by point basis from a fixed translation to become part of a fully dynamic simulation. Each particle was able to disassociate itself from the pre-baked geometry sequence depending upon the velocities applied to that particle from the motion of the wing feathers. Forces such as wind and gravity and collisions were then applied to the once pre-baked particles. This added a dynamic feel to the once choreographed particle movement. The original particle count was preserved and the tear-off flow created a look of connectivity between the wing elements and the environment. As these newly dynamic particles flowed away from the wing, they were acted upon by a velocity field that included the character motion and environment collision objects to achieve a more plausible look of interaction.

Celestial Smooth Flow

The ethereal look of *Tyreal's* wings was achieved through a custom shader that provided passes of the wing geometry's undulating surface base on its surface curvature. The webbing between feather strands was only generated if they were a certain length in camera space view.

Figure 3: *Tyreal* wing element sample passes.

Conclusion

These procedural systems allowed the artists to achieve the director's goals with predictable and repeatable results. We have shown that this method was a viable alternative to solely relying on fluid or gas simulations for fire type effects.

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