# Furtility: Dynamic Grooming for *Wolfman*

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## Abstract

For *Wolfman*, MPC was presented with the challenge of fulfilling the director's creative vision of gradual and graphic werewolf transformations, requiring significant enhancements to Furtility, the company's hair/fur system. Originally developed for *10,000 BC* to create photorealistic mammoths and heavily used since on everything from seaweed to digital double actors, Furtility was extended to handle growing and transforming hair in almost 50 shots for *Wolfman*, many of which were extreme close-ups.

**Figure 1:** *Final rendered image ©2010 Universal Pictures*

## 1 A scriptable and modular fur-system

Furtility was built upon MPC's 3D library, Muggins, and its scripting engine, Giggle, as described in [Haddon and Griffiths 2006]. Both of these allow the software to be easily extended and rapidly customized for specific show needs. This foundation gave us the freedom to improve the software over the years to meet new challenges without having to modify much of its core engine.

The Furtility engine itself is solely built on proprietary or open-source technologies and then exposed via interfaces for the main 3D packages we are using: Maya and RenderMan. We also have the ability to render high quality previews using our in-house OpenGL renderer: MugginsGL.

Although a groom is built using a large number of nodes connected in a graph, the artists are presented with a simple yet powerful interface where they can layer the deformation of the fur using GOPs (Geometry OPerators) that add shape or shading properties to the fur, like length, direction, comb, color etc.

For *Wolfman* we added a very powerful guide curve GOP that gives artists the level of precise control needed when creating creatures with long hair, or digital doubles where the hair style of an actor needs to be faithfully reproduced.

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SIGGRAPH 2010, Los Angeles, California, July 25 – 29, 2010.
ISBN 978-1-4503-0210-4/10/0007

## 2 Adding a time component to grooms

Using Furtility as previously described, our artists were able to create a very convincing wolfman/werewolf that in many ways looked more realistic than the prosthetic version. But for MPC the main challenge of this film project was to create a transformation sequence where the real actor would seamlessly evolve into the full CG character. The transformation is slow, very detailed and fullscreen. To achieve this we introduced a mix of animatable groom properties and dynamic textures that would give artists a way to shape the groom over time.

One of the components of the new tool-kit was an improved version of our procedural texture engine with added support for texture types based on animated maps and particle or geometry caches. This gave the artist the ability to create input textures for the groom that would evolve based on blood flow, geometry stretch maps and other data generated during the transformation. These maps could then be used to drive hair coverage and length, allowing our clean-shaven digital actor to grow a full face of fur.

As a final layer of deformation we added a dynamic simulation to the hair using an algorithm that allowed a stable distribution of guide curves, even on changing surfaces. This secondary motion, while somewhat subtle, added a critical degree of visual realism when layered in with the transitioning hairstyles.

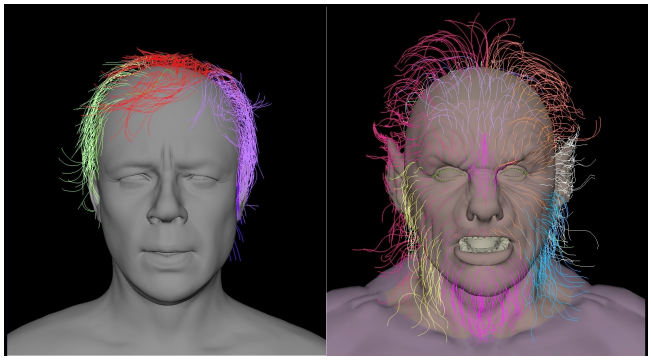

**Figure 2:** *Groomed hairstyles for pre- and post-transformation*

## Summary and Acknowledgements

Delivering the shots on *Wolfman* meant significant new development of our fur system, from the guide curve editor to our 3D texture engine. All of these extensions are being reused for upcoming film projects and are expected to be a permanent fixture in our toolset.

Thanks are owed to Jimmi Gravesen and Jonathan Wills for their contribution to previous versions of Furtility.

## References

HADDON, J., AND GRIFFITHS, D. 2006. A system for crowd rendering. In *SIGGRAPH '06: ACM SIGGRAPH 2006 Sketches*, ACM, New York, NY, USA, 42.