Warcraft's Durotan: Hero, Complex

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Figure 1: *Durotan from* Warcraft. *From left to right: Durotan and Orgrim, Durotan Closeup.*

Abstract

Director Duncan Jones's idea for the *Warcraft* film was to tell the story from two sides. It was critical that the audience be able to empathize with the Orcs and their plight just as much as the human characters. The story of Durotan is that of a Chief trying to lead his Clan through uncertain times. While embracing the signature *Warcraft* style, ILM had to build a photoreal character that pushed new avenues of development at every step of the pipeline. From complex hair styles to pushing the boundaries of ILM's performance capture to simulating the movement of skin over tusks, getting Durotan ready for his closeup was an extraordinary task.

Keywords: Creature, Human, Facial Capture, Simulation, Hair

Concepts: •Computing methodologies → Computer graphics; Animation; Rendering; Texturing;

1 The Sculpt

To create Durotan, we worked from incredible concept art by Blizzard artist Wei Wang. We fully embraced the exaggerated proportions, yet tried to keep the Orcs feeling grounded in reality. As a first step after actors had been cast, ILM incorporated the likeness of each actor into their Orc counterpart and in the case of Durotan this was the actor Toby Kebbell. All of the Orcs shared the same base topology, but to achieve the level of detail needed ILM had to design a new super high resolution humanoid model with a robust multi-resolution pipeline to capture his Orcish features. We gave specific attention to the placement of Durotan's huge tusks to accommodate speech. Remarkably detailed displacement maps were created down to the sub-pore level, including scars, moles, and hairline wrinkles. This allowed us to represent the specular shading of human skin more accurately. Durotan's costume was a combination of cloth, leather, bone, hand-beaten metals, and fur, heralding his Frostwolf heritage.

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2 The Look

For the Orcs' skin, ILM developed a new shading system which allowed texture painters to see the results of the their paint in a mature GL context that accurately mimicked the final rendering. This enabled the texture painters to create more complex shading results than ever before and on Durotan was utilized to create all the layers of sweat, dirt, and skin imperfection that made him believable. The system allowed artists to easily share their best materials, ensuring every asset had the best textures. The system also allowed texture artists to easily run full renders, both interactively and in batch, allowing the lookdev TDs more time to focus on the subtle details of shading.

3 The Groom

For the hair styling on *Warcraft*, ILM developed a new proprietary tool called "Haircraft" that allowed artists to use geometry, fluid simulations, sculpted curves, and procedural systems to author the staggeringly elaborate hair grooms required for the Orcs. Durotan's groom consisted of braids, cornrows, loose hair, facial hair, costume fur, and millions of tiny body hairs that helped add to his realism.

4 The Performance

ILM's goal with Durotan was to faithfully recreate Toby Kebbel's onset performance using our facial capture pipeline. This allowed the Director the confidence to iterate quickly with the actor to find the perfect performance. ILM was able to solve over two hours of facial capture while still allowing animators to tweak the performances when necessary.

5 The Simulation

Durotan required a combination of deformation and simulation techniques including facial capture retargeting, anatomical rigging, and physically based simulations using Stanford's PhysBAM engine running in ILM's Zeno. While a typical ILM asset requires around six simulation layers, Durotan required over forty. Muscle flex was driven by a combination of activation driven shapes, and full muscle and skin simulation. This drove layers of mixed cloth and rigid simulations for costume pieces, costume fur, and complex

layers of tufted and flyaway hairs. We used procedural volume simulations to combine areas that didn't require detailed collisions. We also applied a "tusk deformer" which used a laplacian delta projection to procedurally collide the tusks against the lips of the Orcs during the facial retargetting, preserving the volume in the same space as the facial capture solve. Everything was physically simulated on Durotan down to the rings in his tusk.

6 The Shots

For realistically lighting Durotan in a number of complex environments, ILM developed a new proprietary tool called "Lightcraft" to photogrammetrically solve for the onset lighting. With this Durotan integrated into our live action sets quickly, allowing the artist more time to beauty light to the specific mood of the scene. Hero lights and higher detail settings in the renderer were used to highlight the complexity of motion and look, allowing the digital asset to believably share a scene with the human characters.

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