

## The Bourne Legacy Special Visual Effects - Supporting Statement



Bourne films are known for their intelligent suspense, real world locations and fast gritty action. Any work we did would need to appear achievable with real photography, real actors and real locations. There would be no cinematic tricks or stylization; everything would need to appear totally practical. An exciting challenge considering the shots we were being asked to construct included a fully Digital animal, a burning house, face replacements, heavy snow and military drone.

### **WOLF**

One of the film's earlier sequences sees Aaron trap and wrestle a wild wolf - the scene required a combination of real, animatronic and animated wolf. It was not enough to create an aesthetically pleasing digital animal in isolation; it had to integrate and interact well with the environment of the scene and Aaron.

We arranged a shoot and took measurements of a wolf in a Wildlife Park to collect detailed photo textures, modelling information and animation reference for the animal's movement and behaviour. This prep becoming more complex as the wolf had its summer coat which would change come filming. We adopted a dual build approach to allow for updating of its coat when needed.

During filming, the wolf's unpredictable nature was challenging but the shoot provided enough lighting and movement reference to allow us to place our digital wolf correctly in the environment, creating interactive ground snow as well as giving us holdouts of the surrounding trees for digital falling snow.

References of the Trainer wrestling, in a playful manner, with a real wolf were used as base for the fighting shots between Aaron and the wolf, our animators increasing the viciousness. Bespoke animation had to be created for the wolf trapped, where we see it dangling upside down from a tree.

## **SNOW**

The amount of snow shots grew from an expected 20 to around 200 and much of the snow required were large, fast falling flakes in big complex environments (forests, valleys). 95% of all the snow in the movie is digital.

Adding digital snow to an open vista is fairly simple, but adding it to a dense forest with close foreground actors presents a greater challenge. Apart from the difficulty of adding snow correctly behind trees we needed to have the snow interact with foreground objects and people. This we achieved by bodytracking specific sections of the actors in order to have falling snow collide and roll off a moving form. We also had success using 2D methods: tracking snow flakes onto jackets, hats or the wolf's back.



Several snow crystals were modelled, each traced from photographs of snow-crystals. A small script was written that copied, moved and rotated each snow crystal to a unique position in space. With our in-house rigid body solver, we made a weightless environment where the snow crystals were made to clump together using a small amount of attractive force. From approximately 1 minute of simulation time a unique snowflake was modelled dynamically, each consisting of up to 500 or so crystals. Each snowflake could have a couple of hundred thousand polygons.

## **DRONE**

A full scale, non-moving drone was built practically as part of one of the early scenes. We photographed and surveyed the drone and built a CG version with two additional armed variations. These had to fly through heavy snow and fire missiles.

Image Based lighting was used extensively to merge the Digital Drone with the live action one for the takeoff sequence, and more creative lighting was required for the snow storm sequence to allow us a description of shapes and volumes always without losing the fact that it's a matte object flying through a whiteout of a snowstorm. Compositing had to combine the digital drone with several FX layers to create the desired look for the snowstorm.

## **BURNING HOUSE**

A small section of the ground floor of the house was built which would be topped up with 2 stories of CG. This meant that the house could be placed in a convenient and aesthetically appropriate location and set alight. Some persuasion was required to get the director Tony Gilroy on board. It was extremely important that the ability to create real looking digital fire and smoke was demonstrated. An early test convinced that this was entirely doable.

The lower part of the house was built on location and set alight and shot in hero plate photography, we then used fire/smoke fluid simulations created to match and extend the existing fire considerably. Fire and smoke were created using our proprietary fluid simulation system and supplemented with practical shot elements. The biggest challenge for 2D was to convincingly integrate CG fire and smoke with real fire and smoke and grade and layer all the elements to create a sense of connection with the house and scale, volume and density.



## **FACE REPLACEMENT**

More than any other aspect of visual effects work, human faces need to be absolutely accurate. Our ability to quickly recognize human faces is so powerful that the viewer immediately picks up any minor errors. The use of stunt doubles required the replacement of the faces of Aaron, Marta and Larx throughout a 35 shot chase sequence in Manila. The sequence was the last thing in the schedule to be shot. There would be no time for a specific face replacement shoot.

This meant that we'd need to shoot the faces of the actors without knowing which shots would need face replacements. We needed an approach that could cover any eventuality, any lighting and any shot! We solved the problem by building a 4-camera set up during the last week of photography. The cameras were set up around an upright chair and headrest with diffused polarized lighting to reduce specularity. We then shot each actor going through advised appropriate facial poses on Arri Alexa cameras in RAW format for a low-grain hi-resolution image to give us every possible opportunity to create perfect face-replacement in post.