



2D Goes 3D

an industry op-ed by Steve Wright

There is a paradigm shift under way in the world of compositing visual effects. More and more of the shot finishing is being pushed from the 3D department into the 2D department. The reason being, of course, costs and schedules. Revisions can be made much faster in the 2D department, so both time and money are saved by migrating the work into it. This change has introduced two major innovations, multi-pass cgi compositing and 3D compositing.

Today it is routine to render out several 3D lighting passes that are then combined, color corrected, and refined in the 2D department. A typical list of render passes would include ambient, diffuse, specular, reflection, transparency, occlusion, shadow, grunge, and fresnel. Of course, there is no upper limit here and some elaborate visual effects shots can have 20 or more passes - for each object in the scene! It has reached the point that the 3D department will set up the passes and render them out without over-fussing them or excessive test renders knowing that the 2D department will dial them in and give the shot its final look. This has considerably increased the productivity of the 3D department - and the importance of the 2D department.

Now, a whole new integration of the 2D and 3D departments is emerging as carefully selected 3D capabilities are being added to 2D compositing programs. When you switch to the 3D view in one of these advanced compositing programs you might think you are looking at Maya or 3D Studio MAX. You will see the classic 3D grid with lights, cameras, and geometry. A short list of geometric primitives are available (sphere, cube, etc.) plus the ability to add texture maps and shaders to the geometry. Not much can be done with geometric primitives alone, so there is also the ability to import massive 3D geometry databases built in real 3D systems using standard interchange file formats such as .obj or .fbx.

Match Move

One of the most important 3D compositing techniques is the match move shot. When camera tracking from the match move department is added to 3D compositing a whole new world of visual effects possibilities open up. Any 3D object can be created and "planted" into the original live action and appear to be locked to the scene without drifting around, even with a moving camera. This is an absolute necessity if you want to composite King Kong into the streets of New York.



Fig 1 original plate

We can follow the workflow of a match move shot using the original plate on the left (Fig 1). The mission is to add a wildly out of control sports car to an action scene. The live action plate is camera tracked to derive the position of the moving camera frame-by-frame as well as the 3D tracking markers



Fig 2 tracking markers

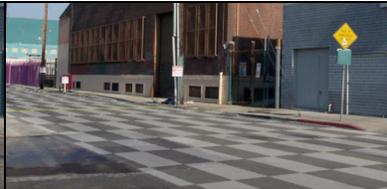


Fig 3 3D reference grid

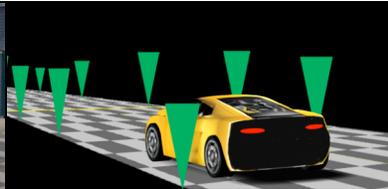


Fig 4 3D car lineup



Fig 5 composited shot

seen in Fig 2. With this information the 3D department can locate the street in 3-dimensional space which is then checked by placing a 3D reference grid (Fig 3) over the original plate to confirm it tracks correctly with the moving camera. The 3D car is lined up with the tracking markers and reference grid (Fig 4) then rendered with the moving

camera track data provided by the match move department. Fig 5 shows the final composited shot with the 3D car perfectly tracking in the original plate even with a wildly moving camera.

Camera Projection

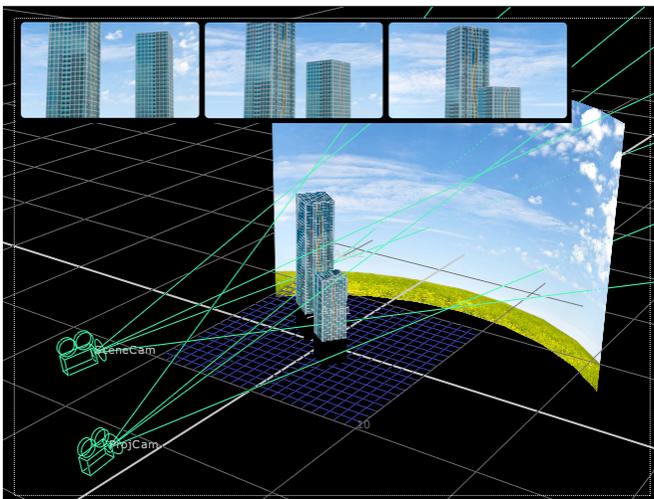


Fig 6 camera projection

Another very powerful use of 3D compositing is camera projection. Here, actual photographs or digital matte paintings are projected over simple 3D geometry then re-photographed by a second 3D camera. This is an incredibly effective technique that produces a lot of picture for very little money. The main virtue is that the photorealistic detail comes from the photographs or matte paintings rather than being painstakingly modeled, textured, and lit in the 3D department.

Fig 6 illustrates the camera projection technique. The top camera is the projection camera that projects a single photograph of the two towers onto some simple 3D cubes. The bottom camera is the scene camera that is re-photographing the scene. Behind the tower cubes is a curved surface with a high resolution photograph of a sky. The scene camera orbits around the buildings photographing them together with the sky. Three frames of the final clip are inserted that show how the scene changes three-dimensionally as the camera orbits around and raises up over the two towers. The perspective on the towers change while the sky drifts by very naturally. This 3D moving camera scene is made with just two photographs and a handful of 3D geometry all inside a 2D compositing program.

With today's tight schedules, competitive pricing, and offshore competition, increasing the efficiency of the visual effects pipeline is more important than ever. Adding 3D compositing has saved time and money by shifting more of the shot finishing into the 2D department than ever before. This, in turn, has raised the artistic contribution of the compositor to new heights. 3D compositing is now a major new tool in the visual effects pipeline that every compositor that wants to future-proof his career will want to learn.

Steve Wright