Drive

3D modeling and simulation company based in Guildford, U.K., Drive's clients include Ford, Lotus, Nissan, Mitsubishi, Samsung, Sony Design, and the U.K. design firm Tangerine. The company creates realistic virtual prototypes of products that are still in their conceptual design stages or are difficult or impossible to show with still photographs.

IVM, a German vehicle development company, hired Drive to create a 3D animation of a retractable car roof for a BMW concept car. While seemingly a routine project, there was no CAD data for the car and only still images to show how the arms for the retracting roof work. To add to the degree of difficulty, the 3D animation needed to be done in 20 days.

Although daunting, it was a project for which Drive, with its combination of industrial modeling and high-end rendering skills, is uniquely qualified. Everyone on Drive's production side is a trained industrial designer with a deep understanding of the 3D modeling process. And, everyone is adept at taking advantage of technology for greater speed and quality.

Drive uses Alias Studio and Maya software for 3D modeling, shading and animation. Rendering is done on a PURE PCI card from ART VPS, which enables image processing to be split across an array of eight specialized ray-tracing chips. ARTVPS's RenderPipe plug-in integrates the PURE card with the Maya GUI.
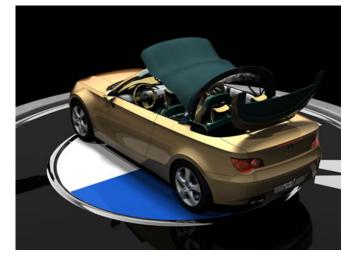
Starting from scratch

Drive began the IVM project by building a complete model of a BMW CS1, interior and exterior, based on photographs downloaded from the Internet. Image planes and cross-sections of photographs were used to interrogate surfaces in Alias Studio, enabling Drive to create quick and dirty models of a volume shape to get started.

"Generally we use a dirty, unfinished model so we can get an idea of the look and feel of the surfaces on the vehicle," says Stuart Boote, Drive's visualization manager. "This is an iterative process; we bring more data into Maya from Studio as it becomes available to create, test and apply shaders."

Putting it in motion

Drive modeled the retractable roof in Maya from still CAD images showing the skeletal arms in various positions. As with the car body, the CAD stills were used as image planes to build surfaces.

Drive created the entire animation in Maya, including controlling the wheels relative to the car's forward movement, windows rolling down, the roof retracting, and scenery motion. "We had lots of camera cuts and needed to pay close attention to the timing of how they were edited together," says Boote. "We found a Maya script called 'camera_main' that allowed the keyframing of the cameras to be viewed through a single viewport."

Eliminating trial and error

The PURE card eliminated a lot of the typical trial and error process of setting up and testing scenes, and gave Drive access to rendering features such as multiple area lights, accurate 3D motion blur and depth of field, secondary illumination, HDRI lighting, and physically based materials, lighting and camera properties.

"We were able to replicate lighting and reflections as if we were setting up a scene in a photography studio," says Boote. "The results were much better than with scan-line rendering and the process was three to four times faster."

When the final model was completed, it was imported into Maya to replace the preliminary models, and shaders were applied and grouped correctly.

Final rendering was done as a batch process over five or six days. In addition to the PURE card, Drive used an ARTVPS RenderDrive system, which provides 36 dedicated ray-tracing processors. Boote estimates that the specialized hardware cut rendering time in half.

ARTVPS