

CAD Takes Role in Making 'Cars' Characters Real

Custom car designer Eddie Paul uses Rhinoceros software to help create real-life, drivable vehicles based on 2D animations

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Eddie Paul is known in Hollywood for creating unique automobiles that take leading roles. The high-flying General Lee in *The Dukes of Hazzard*, the American classics in *Grease* and the modern-day street racers in *The Fast and the Furious* are just a few of Paul's well-known creations. The Southern California inventor and auto-customization wizard's latest project was transforming a Pontiac Trans Am and a 2002 Porsche 911 to resemble the automotive characters Lightning McQueen and Sally Carrera from the summer Pixar animated release, *Cars*.

"Studios give us impossible jobs and very little time to do them," says Paul, president of Customs By Eddie Paul, a division of El Segundo-based [E.P. Industries](#). Paul and his talented crew of fabricators produced real-world versions of the two stars, along with the sidekick tow truck character called Mater, each within a month's time. The cars were displayed at various automotive events across the country to promote the movie's summer debut.

The task of converting 2D cartoon cars into full-size, drivable 3D cars is what led Paul's team to discover Rhino software.



Custom car designer Eddie Paul and his real-life version of Sally Carrera.

Cartoons Come to Life

Rhinoceros software from [Robert McNeel & Associates](#) is a Windows-based 3D freeform modeling system that features NURBS surfacing for accurately sculpting complex curves. The 2D cars' original designs were expressed through animated body tilts and sways. Paul and his staff used Rhino to rework the cartoon renderings into 3D models that were a closer match to real-world sports cars. "We started with the rendered files of the cartoons, which were tilted and not level. We then had to spin them, balance them out and separate the features into individual sections of actual car parts, like fenders and bumpers."

Once the car's modified contours were defined in the Rhinoceros modeler, individual part designs were extracted and sent through E.P. Industries' new 3-axis CNC (computer numerical control) router for fabrication. The CAM software converted the designs immediately into machine language, so Paul's staff could quickly cut the curved parts exactly to the specifications of the Rhino design.

"We do stuff pretty fast around here. We'll be making drawings in the morning and putting parts on the car that evening. Rhino allows us to go from concept to completion in less than 8 hours," says Paul.

Sawing into high-priced sports cars right off the showroom floor might make some car fanatics squeamish, but Paul proceeds with utter confidence. In a Pixar documentary of the *Cars* project, a podcast now downloadable from iTunes, Paul discusses the creation of Sally Carrera: "We've got this brand new Porsche here, and we're going to cut it in half and put it back together."

Paul's mechanics attached the fabricated cut bumpers, fenders and other additions to the shell of the Porsche. "We take the whole body off the car. We attach a hundred different pieces, then we use a special adhesive made by Sem to glue the plastic together like we're building a small model car," says Paul. "When we're all done, we put the Evercoat filler on, sand it, prime it and paint it."



Custom-fabricated parts come together in the process of creating Lightning McQueen.

Obstacles in the Road

Throughout the project, Paul faced some unusual design challenges. For example, each character has eyes instead of a windshield. The windshield was an unconventional shape, but Paul says that using Rhino made it possible to draw and fabricate the design in a single work day, adding, "You have to make the car drivable, so you have to color the windshield with enough transparency that the driver is able to look out." Paul also added a feature to the real-life version so the driver could manually move around the pupils from inside the car.

"Another thing people don't realize is [the character creators] removed all the grills from the car. Instead, we have the mouth there," says Paul. Adding facial features to the body of the car affected the vehicle's performance. "We had to find an alternative way to get airflow into the engine, because without the grills the car couldn't get enough ventilation and had a tendency to overheat." Paul's team installed intake fans to collect air from under the car and from the car's interior.



The final version of the real-life Lightning McQueen.

A third challenge was the actual transportation of the hot rod models. Mater, the tow truck, was 8' tall -- too large to fit in the trailer. "We had to redesign Mater so that the top comes off," explains Paul. "Rhino helped out a lot with that, because we could scale the models so easily."



Eddie Paul poses with the finished Mater.

Flawless Performance

Learning a new 3D product design application did not slow progress in Eddie Paul's fast-paced garage. The learning curve for Rhinoceros software was as fast as any other activity at E.P. Industries, Paul says. The team had used 3D animation programs to some degree in the past, but only started using Rhino shortly before the start of the *Cars* job. "I got Rhino a month before, and I played with it a little bit. From the time I actually installed it, I was making parts that day. I was making more complicated parts the next day. Within a week, we could do the whole car," Paul reports. "Rhino is the easiest program I've ever learned to use. All in all, it's been pretty flawless. "

Paul and his crew created a second set of full-size *Cars* characters to appear next week at the Specialty Equipment Market Association convention in Las Vegas, then to join the Championship Auto Show circuit. The original set of three will return to Eddie Paul's garage for touch-ups, then placed on display at the Pixar Studios front lobby for the anticipated DVD release of *Cars* on November 7.