

Case Study

How Altia helped DaimlerChrysler eliminate 10 weeks of hardware mock-up time and expense.



DaimlerChrysler (NYSE: DCX) is the merger of one of Europe's largest industrial corporations and one of North America's leading automakers. Concerned with the cost of time lost in the decision-making process, one DaimlerChrysler team working on a new lift gate design for a sport utility vehicle cut design time considerably by replacing hardware mock-ups with software simulations.

Altia enabled them to create a virtual prototype that could test the door under different programmed conditions as linked to the models in the simulation software.

The project was a success.

Using a state machine modeling and simulation tool along with Altia Design simulation graphics, the team produced a realistic virtual prototype that enabled them to hand management decision-makers a complete, interactive working model of the lift gate section of the vehicle. Using the simulation to test a number of design considerations, management was able to reach a decision in a fraction of the time formerly taken to create and test hardware prototypes.

The result?

Faster management approval of solutions, speeding the design process and eliminating late design changes that impede engineering progress. The use of Altia reduced money spent, time to market, and decision-making hassles.

The Challenge:

A team of engineers from Jeep® Interior Electrical and Electronics Systems at DaimlerChrysler was in the specification stage of designing the lift gate for a new sport utility vehicle.



Mike Marks
Senior Manager
DaimlerChrysler

“The design of the rear door system had to be depicted realistically - with all the parts interacting - so the performance could be evaluated against the proposed functional objectives. The door system needed to be tested under many different functional scenarios.”

The project involved a number of design considerations including how to open the gate, how the lights are laid out, where the locks are placed, how the wipers and alarm system operate relative to the gate status, and how all the physical and electronic components of the rear door work together.

Wanting to improve upon competitive models, it was crucial that the Jeep team got the design right the first time.

As with any project at this early stage, all feasible solutions needed to be reviewed and approved by Management before Engineering could continue working out the design.

Management usually reviews design considerations in the form of a mock-up prototype. A mock-up is a model created with existing and fabricated hardware, sheetmetal, and electronics that would functionally represent the system. In this case, a mock-up of a lift gate, with all the glass, lights, locks, and peripheral electronics in place, would take months to complete. Even so, a single mock-up would only represent a single set of circumstances; it would not display how the vehicle reacts to certain conditions and it would not display more than one option on function, alarms, etc.

Time was a paramount consideration in this design process, but equally important was preserving innovative thought. All ideas are vague until they are tested under functional constraints. Many great ideas are found incompatible with project goals once they find their way to the engineering phase. The design team could only improve time to market by providing Management with a range of solutions whose cost-effectiveness and feasibility were already proven.

The Solution:

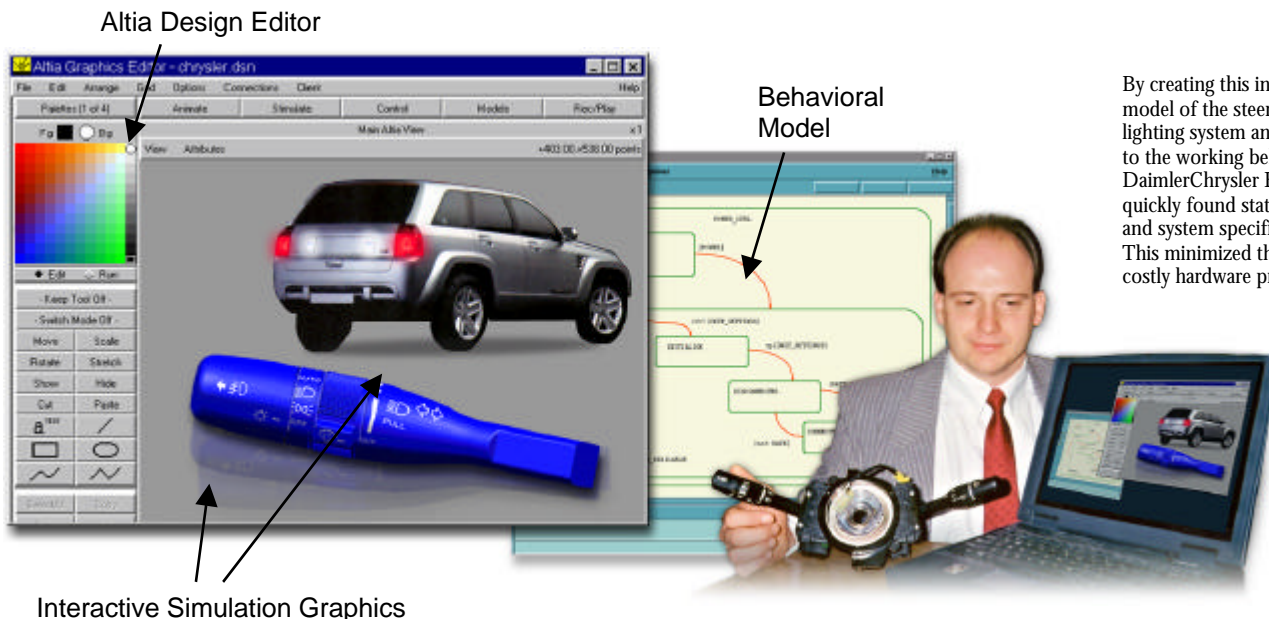
“The Altia model had to be linked to the behavior model for the door to ensure that the system was accurately represented.”

Since mock-ups are typically time intensive and short on demonstrable features, the team finally considered other methods of simulation. Several software companies had come and gone through their doors, delivering information on a range of simulation and state tools for DaimlerChrysler engineers. Altia, Inc. had called on them several times to show the capacity of Altia Design, a software tool that provides an interactive graphic front end to simulation and modeling tools. Since the Jeep team hadn't been using simulation tools at the time, they kept it in mind for future reference.

State machine modeling and simulation tools allow the engineer to write a specification and draw a flowchart that is checked by certain constraints that are logically correct, eliminating problems that usually are not found until later in engineering. Altia Design, completing the visual component of the simulation, puts a visual front end on the design so engineers and managers can “test drive” every feature. Together, these provide a fully interactive, fully functional graphic model of the product. Several design considerations can be programmed into the simulation, tested under select conditions, and eliminated according to design goals. For this project, DaimlerChrysler chose I-Logix Statemate as the state tool to perform behavioral modeling of the lift gate.

“The Altia model had to be linked to the behavior model for the door to ensure that the system was accurately represented,” Marks said. They decided to try it.

The Designer and Product Engineers went to work with Altia Design right away. Just as expected, Altia completed the link between behavior and function. Altia enabled them to create a virtual prototype that could test the door under different programmed conditions as linked to the models in the simulation software. The project was a success.



By creating this interactive virtual model of the steering stalk and lighting system and connecting it to the working behavioral model, DaimlerChrysler Engineers quickly found state machine bugs and system specification errors. This minimized the need for costly hardware prototypes.

The Results:

With the use of Altia's "test drive," the decision-making process was completed in record time and the project proceeded to engineering without customary delays. Mark Rice, a Contract CAD Designer who did the majority of the work with Altia Design, said that it takes 12-14 weeks to assimilate all the pieces for a hardware mock-up. With Altia Design, he had a fully functional working virtual model complete in just four weeks.

"I like the virtual prototyping process," Rice said, adding that he found Altia Design relatively easy to learn under deadline pressure.

Without properly testing conditions for new designs, prohibitive direction changes often occur late in the process. This stalls projects and creates additional costs. The use of a reliable, realistic virtual prototype cut through the waste and kept the whole team on schedule, reducing money spent, time to market, and decision-making hassles. Keeping resources on track is what keeps a company moving forward.



Mark Rice
Contract Designer

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