HyperWorks at Wagon Automotive: Speeding Development Time While Cutting Prototype Costs

Wagon Automotive, a system and module supplier of components to major car builders,
sought ways to accelerate product development and reduce prototyping costs while maintaining high quality.
Adopting the HyperWorks suite of advanced CAE tools enabled the company to achieve both those goals.
Wagon Automotive now uses HyperWorks during the entire development cycle, from concept design to optimization.

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Altair HyperWorks®

The Engineering Framework for Product Design™

Germany-based Wagon Automotive develops and builds systems and modules — doors, structural members, window systems and other essential pieces — for an impressive list of customers that includes VW, Audi, GM, Toyota, Mercedes, Honda, Volvo, Ford, Jaguar and Porsche.

This is a demanding, time-sensitive market. At development and production sites in Europe, Asia and North America, 7,600 Wagon Automotive employees are busy with the design, testing and manufacture of components that must arrive at assembly plants to meet precise production deadlines. Products must be tailored to customers' needs. In addition, the rapidly changing nature of a global industry demands ever-shorter product development cycles from Wagon Automotive engineers.


To sustain its strong competitive position and keep its customers happy, Wagon Automotive, like other Tier One automotive suppliers, has looked for ways to accelerate product development and reduce the growing costs of prototyping. The company found the solution in Altair HyperWorks.

The Clear Choice:
The HyperWorks Suite

Wagon Automotive acquired 50 HyperWorks license units in 2000, after an intensive three-month benchmarking of various CAE software packages. Today, all CAE processes at Wagon Automotive GmbH, from modeling to optimization, are done using HyperWorks tools: HyperView, HyperStudy, HyperMesh, OptiStruct and HyperForm. These advanced tools carry the pre- and post-processing and the simulation load, particularly for linear statics calculations, crash analysis and structural optimization.

"Our primary reasons for choosing HyperWorks included better geometry cleanup functionality, easy interfaces to other simulation tools and the popularity of the software throughout the industry," said Jürgen Diehm, manager of the Simulation Department at Wagon Automotive GmbH.
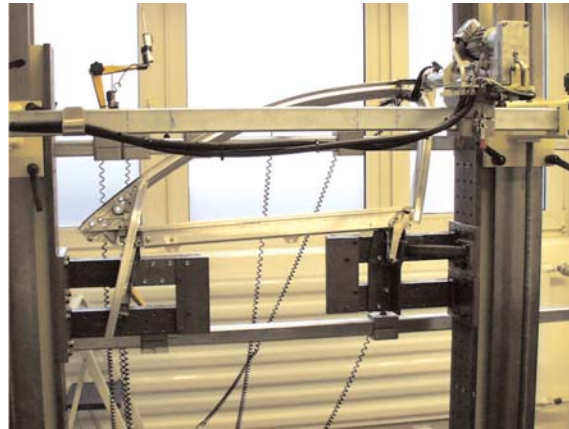
Beyond those criteria, Diehm also wanted to perform end-to-end finite-element analysis (FEA) using a minimum of software platforms as well as to expand his department's use of FEA to crash analysis — both capabilities HyperWorks provided.

"HyperWorks covers a very wide area," said Diehm. "It includes excellent post-processing features and interfaces to other CAE and CAD tools. There are other tools on the market that are good and intuitive, but HyperWorks solvers and optimization tools are even better. We use HyperWorks throughout the entire development phase and for detailed analysis at the end of the process."

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Diehm's department uses HyperWorks for creating simulation models of doors and carrier modules like IP-cross members as well as for vibration and dimensioning calculations. His engineers also design front- and rear-crash management systems for repair load cases and high-speed conditions. Most models are small, but they may be recalculated many times during a single day.

Using HyperWorks as a Conceptual Tool

"Long before we have a design — even before we use CAD software — the project leaders expect us to provide an initial assessment of the concept, based on rough FEA models," said Diehm. "We use HyperWorks during the acqusition phase to help evaluate risks and costs for new component development. We must first determine whether a project is feasible."

"Early integration of FEA in a project is a big advantage for everyone — customer as well as provider. I'm often asked by our sales people to talk to customers about FEA-related issues. Our customers can profit directly from our experience, and they know they can rely on my estimations of the feasibility of a proposed project."

The Greatest Advantage: Reduced Development Costs

"When it comes to crash and lateral-collision analysis, we can no longer work without FEA," said Diehm. "Our customers expect market-driven development and the optimization of every component. Without FEA, we would have significant difficulty delivering the results they expect. Even attempting to do so would be far more expensive."

Once Diehm's department began using HyperWorks for FEA, they found that fewer and fewer physical proto-types were needed. Moreover, development costs and cycle times for new products had been drastically reduced.

"We don't do many physical tests anymore," said Diehm. "We basically cut our design efforts in half by using simulation."

More and Better Analyses

Another advantage of FEA simulation is that it enables Wagon Automotive to test components in much more detail than physical prototyping allows. Engineers can improve and refine products by checking a broader range of parameters and load cases, running tests repetitively without materially affecting the length of the development cycle.

"Five years ago, our crash management team worked with comparatively simple systems," said Diehm. "Today we're able to offer new materials and production technologies that we can guarantee. The contribution FEA has made here can not be overstated."

For example, at one time, the thickness of an automobile door panel was defined arbitrarily and retained as a production specification if it worked on the prototype. Using HyperWorks, engineers can now adjust the door gauges precisely to find the optimal balance of weight and functionality, while reducing materials costs.

"It's clearly easier to test some systems virtually," said Diehm. "In the case of door gauges, we can feed different thicknesses into the simulation, and then run the analysis again to see if the door system still functions as planned. With a real prototype, these iterations would be much too time- and cost-intensive. We've been able to reduce prototypes in this area by half."

Behind HyperWorks: Altair's Renowned Support

Another reason why Wagon Automotive is pleased with HyperWorks is the emphasis Altair continues to place on quality software support.

"The Altair hotline is by far the best I've encountered for FEA," said Diehm. "We always get quick, competent answers. In addition, Altair engineers always provide helpful hints that simplify the use of the software. I really like this proactive hotline approach."

HyperWorks has met every one of Wagon Automotive's expectations.

"To me, HyperWorks is an all-in-one device, suitable for every type of calculation and solver," said Diehm. "Moreover, Altair Engineering didn't skimp on the functionality of its software modules. Each module ranks among the top tools in its category. It is also an advantage when external service providers work with HyperWorks. I'm sure we'll continue to work with HyperWorks in the future."

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