

Automotive and transportation

Volkswagen Group South Africa

Changing a rally car quickly, and with confidence

Products

NX, Teamcenter

Business challenges

Tight timeframe for making changes to race cars

Keys to success

Tight integration of NX and Teamcenter

NX with synchronous technology

Kinematics analysis and finite element analysis

Confidence in Siemens PLM Software and its partner, ESTEQ PLM



Results

Fast changes to existing geometry

Even complex parts can be redesigned in half a day

Fast searches through thousands of drawings

Entire team, suppliers and sponsors kept in the loop

Use of NX and Teamcenter help deliver something more important to a race team than money – time

Great rally record

Established in 1946, Volkswagen Group South Africa (VW Group South Africa – Motorsport Division) is a wholly owned subsidiary of Volkswagen Aktiengesellschaft (VWAG) in Germany. The South African subsidiary has been successfully involved in rally racing for 27 years, with its Volkswagen rally team taking home the top prize for six years in a row.

Rally racing is a type of auto racing that uses modified or specially built road-legal cars. The course can be anything from a paved road to gravel track to a dirt path, or any combination of those, and it is not a circuit but a stage-to-stage format. "Rallying is much tougher than racing. The car has to be competitive for every kilometer out there in the dirt," says Phillip Visser, competitions manager at VW Group South Africa – Motorsport Division.

Another aspect of rally racing that makes it challenging is the extremely limited amount of time available for fixing things that go wrong, or things that the drivers want changed, between race stages. "We

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Johan Smit
Lead Design Engineer
VW Group South Africa –
Motorsport Division



have to get it right the first time,” says Johan Smit, lead design engineer at VW Group South Africa – Motorsport Division. Even during the off-season, the designers and engineers feel pressure to work rapidly, due to the extent of the changes they need to make to the car. “On the current car, we changed more than 400 things from the initial design,” says Smit. “And for each of those changes, we had to test, we had to verify, we had to be sure the drawings were correct.”

Using NX models for analysis and manufacturing

To make sure the rally team has the ability to work accurately at this pace, they use two solutions from Siemens PLM Software: NX™ software for digital modeling and simulation, and Teamcenter® software to manage vehicle information and

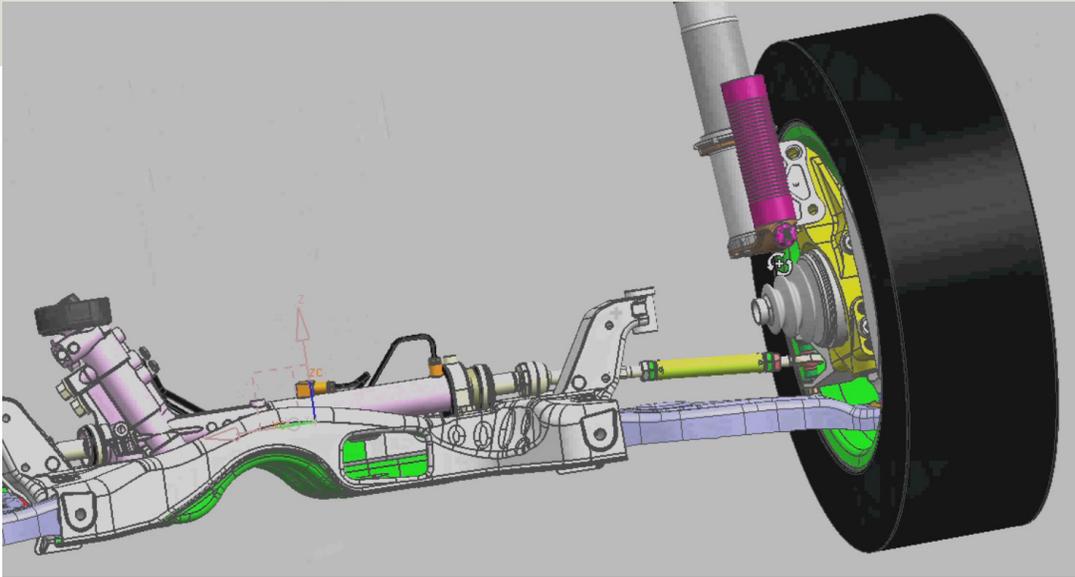
coordinate the work of the designers, engineers, manufacturing personnel and suppliers. This functionality is backed up by support from Siemens PLM Software and its partner, ESTEQ PLM.

All of the design work on the car is done using NX, and the team’s designers take full advantage of the software’s functionality. “Everything is done with NX, from sketching to modeling, to readying a model for FEA (finite element analysis),” says Heinrich Erasmus, the team’s systems design engineer.

One aspect of NX, synchronous technology, is especially valuable to the team because of how quickly it allows changes to existing computer-aided design (CAD) models. Designers use this technology in conjunction with the kinematics analysis

“When you’re changing certain designs in such a short period of time, obviously there must be a level of confidence, and that comes from the Siemens software.”

Johan Smit
CAD Design Supervisor
VW Group South Africa – Motor Division



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and finite element analysis (FEA) of NX Advanced Simulation to quickly evaluate different assembly configurations. For example, there are places in the front-end assembly where the clearance is just a few millimeters, and the team needs to be sure this will be sufficient during a race. They can run the assembly through its range of motion using kinematics analysis. Then, if they see a problem, they can quickly change the geometry using synchronous technology, update the FEA model and repeat the analysis. When this process showed an interference between the wishbone and steering rod, for instance, it took only five minutes to revise the digital assembly and analysis model before they were ready to run another analysis.

The process works similarly with FEA. In the example with the wishbone and steering rod, the designer actually had to cut a notch out of the wishbone to prevent interference with the steering rod. With

FEA results to guide him, he could design the notch in such a way that the wishbone was still strong enough to handle the extreme loads it would be subject to in a race (such as a 5g bump). In another example, the team needed to design a new transmission mount. "In the space of three hours, four different designs were created and evaluated, and by that afternoon we were designing the part that was going into production," says Smit.

Use of NX has been helpful on the manufacturing side as well. Manufacturing engineers can clearly see the parts they will be making. "To actually see the part in the 3D view has changed our way of manufacturing completely," says the team's manufacturing supervisor, Cobus Barnard. In addition, because of the analysis that has been done before the designs reach manufacturing, there is no worry that parts will not fit.

Solutions/Services

NX for Design

NX for Simulation

www.siemens.com/nx

Teamcenter

www.siemens.com/teamcenter

Customer's primary business

Volkswagen Group South Africa – Motorsport Division has been one of the top teams in rally racing for more than 27 years.

www.motorsport.co.za

Customer location

Uitenhage, South Africa

Partner

ESTEIQ PLM

www.esteiq.co.za

“Siemens has really come to the party to assist us to produce probably the biggest success story in the history of South African rallying.”

Phillip Visser

Competitions Manager
VW Group South Africa –
Motor Division

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Using Teamcenter to manage it all

An important part of making changes to the car so rapidly is making sure everyone involved knows what they need to do and when, and has the information they need to do it. That is where Teamcenter comes in. The rally team runs NX within the Teamcenter environment, which manages all of the information related to the vehicle. This includes the CAD data, drawings, analysis results, bills of materials, and so on.

“We have anywhere from 5 to 8 projects going on at once, so there are thousands of drawings,” explains Erasmus. “Teamcenter makes it a lot easier to search for drawings.” The main benefit of this is that designers can focus on the changes to the car. “Teamcenter really simplifies the job of the designer because you’ve got more time to spend doing new designs instead of managing which parts are where and managing a bill of materials,” he adds.

Use of Teamcenter also enables VW Group South Africa – Motor Division to control access to vehicle information so that multiple people can work simultaneously on the same change. “Teamcenter is especially helpful for two designers working in the same vehicle assembly structure,” explains Smit. “They can make changes without corrupting the files.”

Manufacturing engineers benefit from using Teamcenter as well. It enables them to be confident that they are working with up-to-date CAD data. “The manufacturing engineer can just open his Teamcenter system and he can go into the latest revision for manufacturing and have confidence that he can actually manufacture it,” says Smit. The team uses Teamcenter to keep its suppliers and sponsors included in the process as well. “Teamcenter is very important to keeping everybody in the loop,” notes Smit.

From a race team’s standpoint, the Siemens PLM Software solutions provide something that is more important to winning than even money. “The most important thing about motor racing is that all the money in the world cannot buy you time... and that is the bottom line,” says Mike Rowe, motorsport manager at VW Group South Africa – Motorsport Division. The efficiency the team gains from using NX and Teamcenter gives them extra time to make sure that changes are correct the first time, which has certainly contributed to its outstanding success. “Siemens PLM Software has really come to the party to assist us to produce probably the biggest success story in the history of South African rallying,” concludes Visser.

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