

Metal removed from the Equation

January 28, 2012
P 128/13e
Sabine Philipp
Phone: +49 (0)621 60 43348
Mail: sabine.philipp@basf.com

- **Volkswagen Golf: Front end carrier made only from plastic**

The front end carrier in the new Golf 7 is completely made from plastic. This makes the part that owes its shape to elaborate calculations and simulations one of the world's first front end carriers without metal reinforcement. Replacing the previous polypropylene hybrid part with an all-plastic part required use of not only Ultramid® B3WG8, a highly reinforced polyamide during development, but particularly Ultrasim®, the simulation tool from BASF. The sheet steel parts that had been attached previously are now eliminated. This reduces the weight of the front end module significantly compared to that of the predecessor model, saving assembly time and thus costs. Volkswagen produces the part in-house.

Intelligent design with Ultrasim

In addition to limited space for installation, the requirements to the all-plastic part include a variety of very challenging load cases: among them, static and dynamic hood latch failure, where incorrect opening and closing of the engine's hood is simulated and tested under the harshest conditions. At the same time, the stiffness and vibration behavior of the system comprising front end and radiator

BASF SE
D-67056 Ludwigshafen
Phone: +49 621 60-0
<http://www.basf.de>
Communication Performance Materials
Phone: +49 621 60-22142
Fax: +49 621 60-49497
<http://www.plasticsportal.net>

was optimized on the basis of CAE analyses and validated in an actual vibration test.

Crash sensor: correctly predicted

Special attention was devoted to the crash sensors attached to the front end. They ensure deployment of the airbag at the right moment in the event of a head-on collision. For this, the plastic part must exhibit a certain dynamic stiffness at a defined location and satisfy the automaker's crash acceleration requirements. In a real-world test, the vibration response of the part corresponded exactly to what was designed and predicted by Ultrasim: The Ultramid front end carrier transmits the collision signal correctly.

Precision with Ultramid plastic and the Ultrasim CAE tool

The primary load cases provide the basis for a front end design; from these, an optimized topology can be derived. This topology gives the designer valuable information regarding the final shape of the part. Thanks to the highly accurate predictions of Ultrasim, only slight modifications were needed in moving from the prototype of the front end carrier to its serial production. This demonstrates the kind of challenging applications that can be addressed by combining a suitable material with the correct prediction and calculation tools.

Furthermore, Ultrasim, together with its special failure models, can be integrated seamlessly into the calculation environment for the automaker's entire vehicle. This requires, however, that very specific, e.g. crash-relevant material data for the plastic, be available which describe exactly the effect of temperature, moisture and rate of load application. A simulation is thus preceded by acquisition of extensive material data from experiments conducted with the aid of complex testing and measuring instruments. The simulation tool is then able to

predict failure behavior, strain rate dependence, and even tension-compression asymmetry as a function of fiber orientation.

More information on Ultramid and Ultrasim can be found on:

www.ultramid.de

www.ultrasim.basf.com

Information on Ultramid® from BASF: ultraplaste.infopoint@basf.com
or under telephone number +49 (0) 621 60 78780.

Press photo: Available at www.basf.com/pressphoto-database under the heading "Plastics" or search term "Ultramid. Text and photo are also available in the Plastics press archive of BASF: www.basf.de/plastics/pressreleases.

About BASF

BASF is the world's leading chemical company: The Chemical Company. Its portfolio ranges from chemicals, plastics, performance products and crop protection products to oil and gas. We combine economic success, social responsibility and environmental protection. Through science and innovation we enable our customers in almost all industries to meet the current and future needs of society. Our products and system solutions contribute to conserving resources, ensuring healthy food and nutrition and helping to improve the quality of life. We have summed up this contribution in our corporate purpose: We create chemistry for a sustainable future. BASF posted sales of about €73.5 billion in 2011 and had more than 111,000 employees as of the end of the year. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (AN). Further information on BASF is available on the Internet at www.basf.com.