ISSUE
02
SEPTEMBER
2016

INFORMATION
TECHNOLOGY
&
APPLICATIONS

Lamera

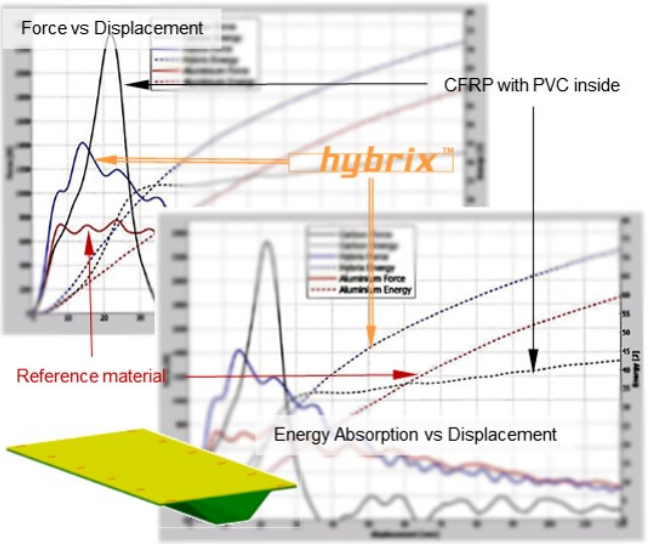
Hybrix™ material and its Crash Performance

Hybrix™

Using an advanced material as Hybrix™ leads to endless opportunities when designing lightweight constructions, Hybrix™ is 50% lighter than equal solids with the same rigidity and stiffness. The sandwich material is a very thin (0.5 - 3.5 mm) metal micro-sandwich that is strong, formable and light weight with a total weight between 1.0 - 8.5 kg/m^2 (depending on the configuration).

The unique micro-sandwich design also provides good insulation and dampening properties. Being able to use everything from stainless steel to copper to aluminum makes Hybrix™ a very formable material, unlike conventional lightweight sandwich materials.

One of the major challenges for the automakers is to improve the driving performance by enhancing the weight balance between front and rear compartment of the vehicle. The task is not so straight forward due to the natural location of the engine compartment and the powertrain. One common solution is to reduce the weight of the adjacent components, e.g., bonnet, wheel drive system, chassis components, battery, etc.. Therefore, using advanced and innovative materials are almost essential for automaker.



The leading car manufacturers, Volvo Cars, with automobile safety strategy as the first point of its development agenda, has taken initiative to apply new materials to enhance the common weight balance issue and improve the pedestrian safety in a frontal collision scenario. In order to verify the performance of the new material, the project team has decided to purchase and build beam sections of three selected materials sharing the same geometry to perform impact tests in Volvo's drop tower facility.

Based on an extensive literature study two potential material structures namely, Carbon Fiber Reinforced Polymer (CFRP), and Hybrix™ micro-sandwich material beside aluminum as a reference material were selected. The target materials were found to be appropriate regarding impact resistance and flexural stiffness with the focus on reducing the weight, while meeting important demands on the bonnet safety feature.

The results from the investigation confirm that the CFRP beam with inside PVC foam absorbed least amount of energy at the impact test and it was only located in the elastic region of the material. This indicates that the structure did not have the ability to plastic deformation which is an important requirement for the proposed application. However, it is possible to reduce the total weight up to 24% lighter than the reference material.

The Hybrix™ material with temper-rolled stainless steel grade as face materials, absorbed most amount of energy with almost 23% higher energy absorption capability. It is almost a parallel upward shift of the reference material's energy absorption curve. However, the structural beam with Hybrix™ design together with existing configuration was 27% heavier than the aluminum material.

While there is no question that, specific analyses are needed for the bonnet with A Well Weight Optimized Hybrix™ configuration.

hybrix™

Lamera AB

E-mail: info@lamera.se
Office: +46 31 757 71 80
Web: www.lamera.se

A Odhners gata 17
SE-421 30 Västra Frölunda
Sweden

Bengt A.G. Nilsson, CEO

cleantech inn sweden